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The Entocytherid Ostracod Fauna of Southeastern Georgia

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MARGARET D. ANDOLSHEK
and
HORTON H. HOBBS, JR.

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ABSTRACT

Andolshek, Margaret D., and Horton H. Hobbs, Jr. The Entocytherid Ostracod Fauna of Southeastern Georgia. *Smithsonian Contributions to Zoology*, number 424, 43 pages, 20 figures, 3 tables, 1986.—The entocytherid ostracod fauna of southeastern Georgia consists of 11 species belonging to the following genera: *Ankylocythere*, 5; *Dactylocythere*, 1; *Entocythere*, 3, and *Uncinocythere*, 2. They infest two or more of the 28 epigean crayfishes that occur in the Coastal Plain Province in and between the Savannah and Suwannee river basins of the state. Two new species, *Ankylocythere spargosis* and *Entocythere prisma*, are the only entocytherids that have not been reported to occur outside of the study area. Spot maps depicting the locality records for each ostracod are provided along with diagnoses, summaries of their ranges, and illustrations of variation. Their assocations with the crayfish hosts and other entocytherids occurring in the coastal plain are tabulated, and a key for recognizing the ostracods is included.

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The Entocytherid Ostracod Fauna of Southeastern Georgia

Margaret D. Andolshek and
Horton H. Hobbs, Jr.

Introduction

This study constitutes the second regional investigation of the entocytherid fauna of Georgia and is devoted to the southeastern part of the state. Whereas the previous work by Hobbs and Peters (1982) treated those segments of the Coosa and Tennessee basins located in northern Georgia, embracing parts of four physiographic regions, the area treated herein encompasses much or all of seven major drainage systems lying within or traversing the Coastal Plain Province.

Virtually all of the material available to us was obtained during a survey of the crayfishes of the state (Hobbs, 1981). Represented among it are 11 entocytherids that were found infesting one or more of 27 of the 28 species and subspecies of crayfishes occurring in the region.

Although comparatively few samples of entocytherids are available from adjacent regions, insofar as we are aware, two species occurring here are endemic to southeastern Georgia. Neither *Ankylocythere spargosis* nor *Entocythere prisna*, both of which are described herein, has been encountered in neighboring areas, but it is possible, if not likely, that both will be found in at least the lower Savannah Basin in South Carolina, and that the latter also occurs in the northeastern part of Florida.

The synonymies of the ostracods treated herein are, for the most part, limited to the original descriptions and references to studies that have been published subsequent to 1973. Earlier ones are cited by Hart and Hart (1974) in their monograph of the Family Entocytheridae. Complete synonymies are offered for *Ankylocythere freyi*, which was described subsequent to 1974, for *An. hobbsi*, which has been mentioned few times in the literature, for *An. spargosis*, described herein, and for *Entocythere elliptica* and *Uncinocythere equicurva*, which are recognized herein as senior synonyms of two and three previously recognized species, respectively. Diagnoses, statements of the ranges, locality records for all except *An. ancyla* and *E. elliptica*, the most widespread species in the area, and remarks, where deemed pertinent, conclude the treatment of each. Because we have found no characters that serve adequately to identify the female ostracods in southeastern Georgia, diagnoses and comments on them have been largely omitted in this account.

All specimens are deposited in the National Museum of Natural History, Smithsonian Institution. (USNM = collections of the former United States National Museum, deposited in the National Museum of Natural History, Smithsonian Institution.)

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Previous Studies of Entocytherids in Southeastern Georgia

The earliest report of the occurrence of entocytherids in southeastern Georgia is that of Hoff (1944) who described *Entocythere equicurva* from Camden County, *E. dorsorotunda* from Ben Hill, Clinch, and Pierce counties, *E. elliptica* from Clinch County, and *E. hobbsi* from Ben Hill County. Thus one-third of the species occurring in the area were known to be present in the southeastern part of the state some 40 years ago.

There were no other reports of the entocytherids of the region until Hart and Hart (1974) recorded the presence of *Ankylocythere ancyla* Crawford (1965) in Atkinson, Burke, Coffee, Emanuel, Evans, Jeff Davis, Laurens, Liberty, Lowndes, Montgomery, Screven, Treutlen, and Wheeler counties; *An. hobbsi* in Cook, Echols, Laurens, and McIntosh counties; *An. sinuosa* (Rioja, 1942) in Bleckley and Twiggs counties; *An. telmoecea* (Crawford, 1959) (= *Uncinocythere equicurva*) in Burke, Chatham, and Twiggs counties; *An. tiphophila* (Crawford, 1959) in Montgomery, Telfair, and Wilkinson counties; *Entocythere dentata* (Crawford, 1965) in Cook County; *E. dorsorotunda* in Ben Hill, Clinch, Echols, and Pierce counties; *E. elliptica* in Burke, Emanuel, Liberty, McIntosh, and Screven counties; *E. internotalus* (Crawford, 1959) (= *E. elliptica*) in Atkinson, Brantley, Echols, Glynn, Lowndes, Montgomery, and Treutlen counties; *Uncinocythere equicurva* in Camden, Laurens, and Twiggs counties; *U. lucifuga* (Walton and Hobbs, 1959) (= *U. equicurva*) in Bibb, Bleckley, Burke, Dodge, McIntosh, and Twiggs counties. In summary, the fauna of southeastern Georgia was reported by them to consist of eleven species; however, three of them (*An. telmoecea*, *U. lucifuga*, and *E. internotalus*) are considered by us to be junior synonyms of *U. equicurva* and *E. elliptica*, and we did not encounter *An. sinuosa* and *E. dentata* among our collections. We have examined their specimens and have assigned their *An. sinuosa*, with reservations, to *An. freyi* Hobbs III (1978) and *An. tiphophila*, and their *E. dentata* to *E. dorsorotunda*.

The only subsequent reference to the entocytherid fauna of this section of the state is that of Hobbs (1981). In an appendix to his account of the crayfishes of Georgia, he listed the crayfishes and the entocytherids that have been reported to infest them, taking most of this information from Hoff (1944) and Hart and Hart (1974).

As can be seen in the list of species in Tables 1–3, five additional entocytherids, two of which have not been described previously, are added to the fauna of southeastern Georgia, and as might be anticipated, a number of new locality and host records are cited for those species previously reported from the region.

Area under Consideration

A little more than half of the Coastal Plain Province of the state is included in the area on which this report is based. It encompasses a small segment of the Fall Line Hills, the Vidalia Upland, Barrier Island Sequence, Bacon Terraces, Okefenokee Basin, and the eastern edge of the Tifton Upland districts (Clark and Zisa, 1976). The altitude ranges from approximately 150 meters to sea level, and within the area the tilted early Cenozoic sediments are largely overlain by Miocene and Pleistocene deposits including clay, limestone, marl, sand, and dolostone. A broad array of aquatic habitats is available to the ostracods and their crayfish hosts, ranging from

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spring-fed rivulets and rocky streams of the uplands to the large, sluggish, coffee-colored streams, ponds, and swamps of the Barrier Island Sequence and Okefenokee Basin districts. Ground water is also utilized along streams and in pitcher plant bogs of the Vidalia Upland District. Elsewhere, especially in the Okefenokee Basin and Barrier Island Sequence districts, the flatwoods offer burrowing crayfishes and their symbionts ready access to groundwater. Seasonal anastomosies of streams have left few low-lying areas lacking crayfish populations that support entocytherid communities. Swiftly flowing waters, except during flood stages, are virtually absent from the southeastern sector of the state. A discussion of the available crayfish (and hence entocytherid) habitats in Georgia is presented in Hobbs (1981:24). Despite this comparatively wide range of habitats in the area, apparently a similar entocytherid-host relationship obtains as that existing in northern Georgia (Hobbs and Peters, 1982:298):

> Unlike entocytherid faunas in other areas in which unique species are symbionts of those crayfishes largely restricted to burrows, the ostracods infesting the burrowing crayfishes in northern Georgia are members of some of the same species that are found on the stream-dwelling crayfishes frequenting nearby epigean habitats.

Entocytherid Associates and Infestations

Frequently more than one species of entocytherid infests a single crayfish, and several crayfish species sharing a single locality may be infested with the same ostracod. Most of the latter available for this study were obtained from containers in which all of the crayfishes (one to four species) collected at a single locality were preserved together. Thus the ostracods could not be associated with a single host species. Only for those ostracods obtained from collections containing specimens of a single crayfish species can a specific host-commensal relationship be assumed to exist. In Table 2 the numbers refer to the number of times the corresponding crayfish was in collections from which the ostracod was taken, and the circles indicate that the ostracod was collected in at least one locality from a single host species, thus establishing a definite ostracod-crayfish association.

As in the northern Georgia entocytherids (Hobbs and Peters, 1982:298), "Whereas an obligate association with . . . crayfishes exists for all of the entocytherids in the area, evidence exists that none requires a specific host." Every species in southeastern Georgia was found on two or more hosts except *Dactylocythere striophyiax*, which could be associated unquestionably with only one host, *Cambarus (D.) latimanus* (LeConte, 1856). At least two other ostracods infested members of this host species, and there is no reason to believe that in the area *C. (D.) latimanus* is the only acceptable host of the ostracod, for it was found in "37 collections in [the] Broad River drainage" of South Carolina in which this crayfish was not one of the hosts in any of the localities (Hart and Hart, 1974:71).

The least discriminating entocytherid of the area, in terms of the hosts it infests, is *An. ancyla*, which is associated with 17 of the 28 species of crayfishes occurring in the southeastern part of Georgia.

Entocytherid Distribution in Southeastern Georgia

TABLES 1–3

In most of the collections examined, more than one species of ostracod were present, and many, if not most, of those obtained from a single host species contained representatives of two or three species. The frequency of the occurrence of each with other entocytherids is listed in Table 3. For reasons presented below, it is not surprising that *An. ancyla* and *E. elliptica* were found together more frequently than any other combinations of species.

In terms of their occurrence in the region, *An. ancyla* was by far the most common of the eleven entocytherids present. It occurs in 62.2 percent of the localities from which specimens are available; that is more than twice as many as frequented by any other except *E. elliptica*, which

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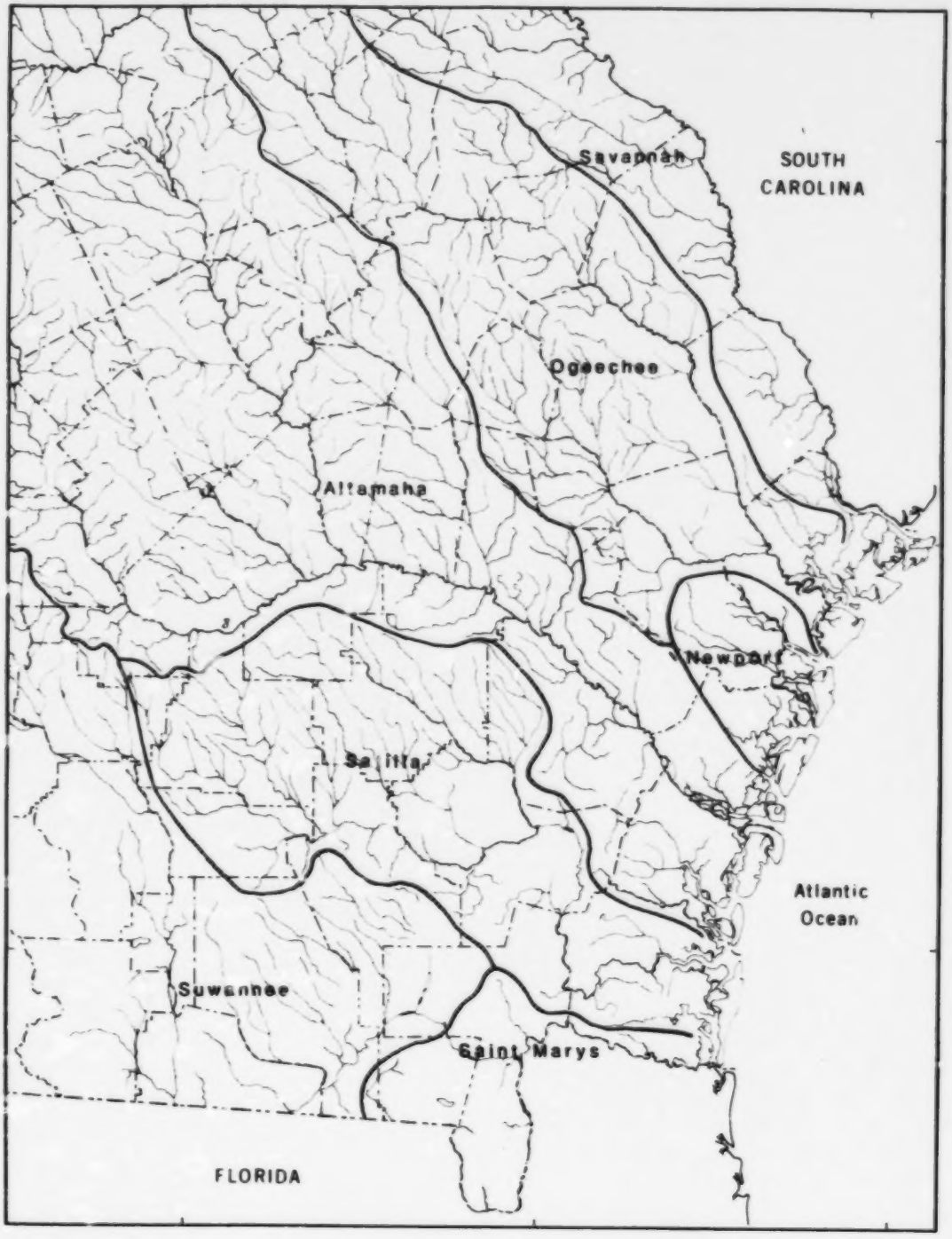

FIGURE 1.—River Basins in Southeastern Georgia.

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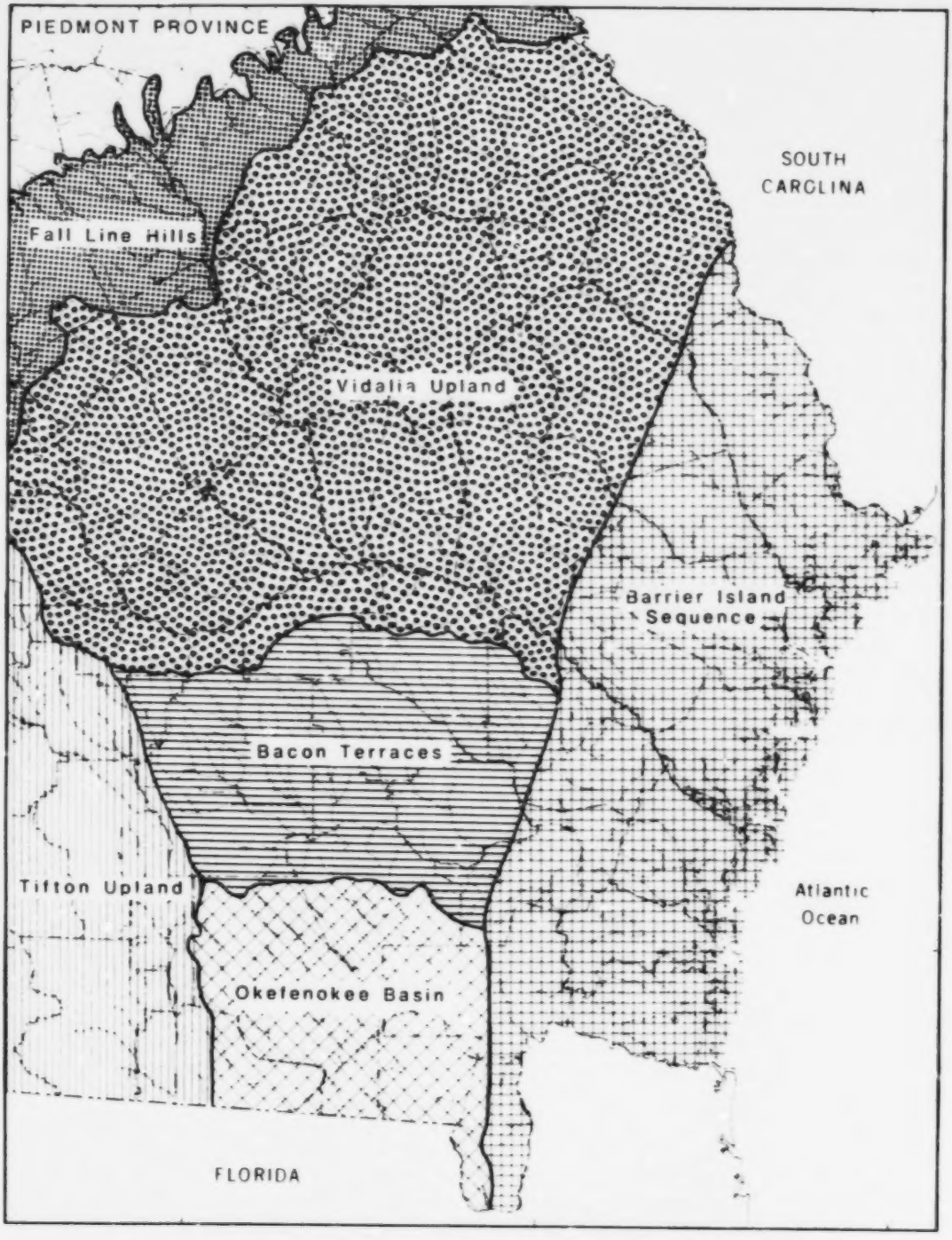

FIGURE 2.—Districts of the Coastal Plain Province in southeastern Georgia.

COASTAL PLAIN PROVINCE	ENTOCYTHERIDS										
	An. ancyla	*An. freyi*	*An. hobbsi*	*An. spargosis*	*An. tiphophila*	*Dt. striophylax*	*E. dorsorotunda*	*E. elliptica*	*E. prisma*	*U. equicurva*	*U. simondsi*
DISTRICTS											
Fall Line Hills		●			●			●		●	●
Vidalia Upland	●	●	●	●	●	●		●	●	●	
Tifton Upland	●		●				●	●		●	
Bacon Terraces	●		●				●	●	●		●
Okefenokee Basin	●		●				●	●			
Barrier Island Sequence	●	●	●	●	●	●	●	●	●	●	●
DRAINAGE BASINS											
Savannah	●	●	●	●	●	●		●		●	
Ogeechee	●	●		●	●	●		●	●	●	
Newport	●			●				●			
Altamaha	●	●	●	●	●			●	●	●	●
Satilla	●		●	●	●		●	●	●	●	●
Saint Marys								●		●	
Suwannee	●		●				●	●		●	

TABLE 1.—Distribution of entocytherids in districts of Coastal Plain Province and in drainage basins of southeastern Georgia.

was found in 44.0 percent of the localities. The other species were represented by the following percentages: *An. hobbsi*, 19.8%; *E. prisma*, 18.1%; *U. equicurva*, 14.1%; *E. dorsorotunda*, 7.3%; *An. spargosis*, 6.2%; *An. tiphophila*, 4.5%; *An. freyi*, 4.0%; *Dt. striophylax*, 2.3%; and *U. simondsi*, 1.7%.

The most widespread entocytherid in the region is *Entocythere elliptica*, which infests at least 10 of the crayfish species and has been found throughout the area in all seven of the drainage basins. Also widespread, more common, and infesting 17 crayfishes, but not known to occur in the Fall Line Hills District or in the St. Marys watershed, is *An. ancyla*. *Ankylocythere hobbsi* is rather common south of the Altamaha Basin but north of the river appears to be replaced largely by *An. spargosis*. Comparing their ranges with that of *U. equicurva* (Figure 9) in southeastern Georgia, we suggest the possibility that there they are vicariating for one another for we have no record of either *An. hobbsi* or *An. spargosis* occurring in the same locality with *U. equicurva*, yet populations of the latter almost surround their combined, slightly overlapping ranges. The range of *Entocythere prisma* lies almost within that of *An. hobbsi* and *An. spargosis*, with almost half of the known localities occurring in the Bacon Terraces District and the other in the Barrier Island Sequence District.

Similar to *An. hobbsi*, but with an even more restricted range, *E. dorsorotunda* appears to be confined to the Bacon Terraces and that part of the Barrier Island Sequence District that lies south of the Altamaha River.

Insofar as we are able to determine, the southern limit of the range of *Dt. striophylax* occurs within the area. Also the locality in Camden County for *U. simondsi* is the southeasternmost record for the species, and the localities for *An. freyi* in the Savannah Basin mark the easternmost reported for that species. Only the sparsity of localities for *An. tiphophila* in the area is noteworthy.

Ankylocythere freyi is probably the most restricted in its distribution of any of the entocytherids encountered in this study. In all of the localities cited for it by Hobbs III (1978), the hosts were dug from burrows, and except for the localities in Bleckley (based on a questionable determination) and Screven counties, the same is true for those recorded here. Uncertainty also surrounds the identity of a single specimen from Bryan County having strikingly different clasping apparatus (Figure 6*g*,*h*) and that from Coffee County (Figure 6*i*). It is puzzling, however, that there are so few records in this area, for in at least half of the localities from which our specimens came some or all of the crayfishes collected were from burrows. We have no explanation for the discontinuity in the range that seems apparent between the localities plotted in Figure 7. It is tempting to suppose that there is some connection between the fragmentary range and that plotted by Hobbs (1981, fig. 87) for the crayfish *Cambarus (L.) diogenes* (the most frequently cited host, in 6 of 10 localities, by Hobbs III). We have so few entocytherids that were gleaned from this crayfish (indeed few specimens of the crayfish!)

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ENTOCYTERIDS	HOSTS																												
	C. (D.) latimanus	*C. (D.) reflexus*	*C. (D.) striatus*	*C. (D.) truncatus*	*C. (L.) d. diogenes*	*F. clypeata*	*P. (H.) aduena*	*P. (H.) carinus*	*P. (H.) pygmaeus*	*P. (H.) talpoides*	*P. (H.) truculentus*	*P. (L.) barbatus*	*P. (L.) p. deficiens*	*P. (L.) p. pubischelae*	*P. (O.) a. acutus*	*P. (O.) enoplosternum*	*P. (O.) epicyrtus*	*P. (O.) fallax*	*P. (O.) litosternum*	*P. (O.) lunzi*	*P. (O.) pubescens*	*P. (O.) seminolae*	*P. (Pe.) peteri*	*P. (Pe.) raneyi*	*P. (Pe.) spiculifer*	*P. (S.) hobbsi*	*P. (S.) howellae*	*P. (S.) peninsulanus*	*P. (S.) troglodytes*
An. ancyla	3	1	1		1		16	10	7	16	3	24	15	24	6	14	7		18	6	2	31		1	1	2	1	14
An. freyi		4				1						1								1		1				1		
An. hobbsi		1				3	1	11	1	24			2	6								7				4		1
An. spargosis							1		7			3				2	2		1	2		1						7
An. tiphophila				1	1	4										2					1				1	3		1
Dt. striophylax	4															1					2		1					1
E. dorsorotunda									1	10				4								3						
E. elliptica	4					4	8	1	9	1	3	13	4	4	4	15	10		5	9	8	14	3	1	3	8	2	13
E. prisma						1	2	10	9	11	1	5	7	2	1	3	1		2	3		8				1		8
U. equicurva	6		4	1		3			1						3	4					3		4		2	4	2	8
U. simondsi			1	1				1																			1	

TABLE 2.—Entocytherids and their crayfish hosts in southeastern Georgia (numbers represent frequency of associations observed in present study; circles designate known host-commensal relationships; see "Entocytherid Associates and Infestations" for more detailed explanation).

in the area considered herein that we are not surprised that their association has not been encountered, and we suspect that not having done so reflects a lack of adequate sampling in the Savannah and Altamaha river basins.

With respect to the river basins, the Savannah watershed is populated by all of the entocytherids occurring in the area except *E. dorsorotunda* and *U. simondsi*; the Ogeechee Basin lacks the latter two and *An. hobbsi;* the Altamaha and Satilla basins are frequented by all of the species in the area except *E. dorsorotunda*, which is absent from the Altamaha, and *An. freyi*, which is not known to occur in the Satilla. The Suwannee, which perhaps has not been adequately surveyed, harbors only five of the eleven species, and, as one might anticipate, the river basins with the fewest species are the Newport (three species) and the St. Marys (two species). Their basins are much smaller than those of the other drainage systems and, correspondingly, are represented by fewer collections.

Summarized below are the numbers of species of entocytherids and crayfishes occurring in the Coastal Plain Province of the southeastern part of Georgia:

Districts	*Entocytherid species*	*Crayfish species*
Fall Line Hills	5	11
Vidalia Upland	9	21
Tifton Upland	5	8
Bacon Terraces	6	10
Okefenokee Basin	4	6
Barrier Island Sequence	11	23

Some of the differences noted in the distribution of the entocytherids in the river basins and districts might reflect inadequate sampling in those supporting fewer species; however, we are inclined to believe that most are realistic. The rarity of *U. simondsi* and the distances between

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ENTOCYTHERIDS	ENTOCYTHERID ASSOCIATES											
	An. ancyla	*An. freyi*	*An. hobbsi*	*An. spargosis*	*An. tiphophila*	*Dt. striophylax*	*E. dorsorotunda*	*E. elliptica*	*E. prisma*	*U. equicurva*	*U. simondsi*
An. ancyla		3	11	5	1	1•	4	45	22	4	1
An. freyi	3		2	1			1	1			
An. hobbsi	11	2		2•			9	7	7		1
An. spargosis	5	1	2•					7	5		
An. tiphophila	1							2		2	
Dt. striophylax	1•							2		2•	
E. dorsorotunda	4	1	9					1	2		
E. elliptica	45	1	7	7	2	2	1		9	9	
E. prisma	22		7	5			2	9			
U. equicurva	4				2	2•		9			2
U. simondsi	1		1						2		

TABLE 3.—Associations of entocytherids in southeastern Georgia (numbers indicate frequency of species occurring in same locality); except those accompanied by dot, two share the same host species in at least one locality).

the three known localities, however, suggest that it might have been overlooked in the Vidalia Upland and Bacon Terraces districts.

A comparison of the entocytherid and crayfish faunas of northern Georgia (as defined by Hobbs and Peters, 1982) and southeastern Georgia reveals little similarity. Of the 13 ostracods, representing six genera, found by them, only three (*An. telmoecea* (= *U. equicurva*), *E. elliptica*, and *U. simondsi*) were encountered in the present study. No representatives of the genera *Ascetocythere*, *Cymocythere*, and *Donnaldsoncythere* have been found in the Coastal Plain Province of Georgia, and the dominant genus *Dactylocythere* of northern Georgia, where six species were found, is sparsely represented by a single species in our collections from the Coastal Plain. The dominant genus of the latter province in Georgia is obviously *Ankylocythere* which there comprises five species, almost half of the entocytherids known from the region. Noteworthy perhaps is the observation that most *Dactylocythere* infest members of the crayfish genus *Cambarus*. (Of the 11 members of *Dactylocythere* occurring in North Carolina (Hobbs and Peters, 1977:6), only two were found to infest members of the genus *Procambarus*, and of the six occurring in northern Georgia, only one infests a member of *Procambarus* and another, a member of *Orconectes*). Conversely, members of the genus *Ankylocythere* are far more frequently associated with crayfishes belonging to the genus *Procambarus*, the dominant crayfish group occurring on the coastal plain from North Carolina to Middle America. Of the 27 crayfishes occurring in northern Georgia, 22 belong to the genus *Cambarus*, and only two, to *Procambarus* (see Hobbs and Peters, 1982:301). In contrast, of the 28 crayfishes in southeastern Georgia, 22 belong to the genus *Procambarus*, and only five to *Cambarus;* the latter are rare, or at least difficult to find. Only three crayfishes occur in both sections of the state. Thus, indeed, there are contrasting entocytherid and crayfish faunas in northern and southeastern Georgia.

The host crayfishes of southeastern Georgia are reviewed in Hobbs (1981). In that summary, synonymies, ranges, and notes on their biology are presented. The following species and subspecies are known to harbor one or more of the eleven entocytherids that have been found in this section of the state: *Cambarus (Depressicambarus) latimanus* (LeConte, 1856); *C. (D.) reflexus* Hobbs, 1981; *C. (D.) striatus* Hay, 1902; *C. (D.) truncatus* Hobbs, 1981; *C. (Lacunicambarus) diogenes diogenes* Girard, 1852; *Faxonella clypeata* (Hay, 1899); *Procambarus (Hagenides) advena* (LeConte, 1856); *P. (H.) caritus* Hobbs, 1981; *P. (H.) pygmaeus* Hobbs, 1942; *P. (H.) talpoides* Hobbs, 1981; *P. (H.) truculentus* Hobbs, 1954; *P. (Leconticambarus) barbatus* (Faxon, 1890); *P. (L.) pubischelae deficiens* Hobbs, 1981; *P. (L.) pubischelae pubischelae* Hobbs, 1942; *P. (Ortmannicus) acutus acutus* (Girard, 1852); *P. (O.) enoplosternum* Hobbs, 1947; *P. (O.) epicyrtus* Hobbs, 1958; *P. (O.) fallax* (Hagen, 1870); *P. (O.) litosternum* Hobbs, 1947; *P. (O.) lunzi* (Hobbs, 1940); *P. (O.) pubescens* (Faxon, 1884); *P. (O.) seminolae* Hobbs, 1942; *P. (Pennides) petersi* Hobbs, 1981; *P. (Pe.)*

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raneyi Hobbs, 1953; *P. (Pe.) spiculifer* (LeConte, 1856); *P. (Scapulicambarus) howellae* Hobbs, 1952; *P. (S.) paeninsulanus* (Faxon, 1914); *P. (S.) troglodytes* (LeConte, 1856).

Family ENTOCYTHERIDAE Hoff, 1942

Subfamily ENTOCYTHERINAE Hoff, 1942

Key to Entocytherid Fauna of Southeastern Georgia

(Based on male copulatory complex)

1. External border of horizontal ramus of clasping apparatus bearing long or short free talon. *Ankylocythere* 2
   External border of horizontal ramus of clasping apparatus lacking talon. 6
2. Horizontal ramus of clasping apparatus subtruncate to broadly concave distally . . . . . ***Ankylocythere spargosis***
   Horizontal ramus of clasping apparatus tapering distally or of almost uniform diameter, never truncate or broadly concave distally 3
3. Clasping apparatus with vertical ramus at least twice as long as horizontal ramus . . . . . ***Ankylocythere hobbsi***
   Clasping apparatus with vertical ramus distinctly less than twice as long as horizontal ramus 4
4. Talon at least 1.5 times as long as vertical diameter of horizontal ramus just distal to tooth on preaxial border and almost always reaching at least midway between tooth and apex of ramus. . . . . ***Ankylocythere ancyla***
   Talon less than 1.5 times as long as vertical diameter of horizontal ramus just distal to tooth on preaxial border and never reaching midway between tooth and apex of ramus 5
5. Talon with proximal three-fourths almost straight and disposed at angle of at least 45 degrees to horizontal ramus ***Ankylocythere tiphophila***
   Talon gently curved and disposed subparallel to horizontal ramus, always at angle of less than 45 degrees . . . . . ***Ankylocythere freyi***
6. Copulatory complex with finger guard . . . ***Dactylocythere striophylax***
   Copulatory complex lacking finger guard 7
7. Clasping apparatus with heel-like prominence at postaxial junction of rami and/or horizontal ramus bearing 8 teeth (including apical denticles). *Entocythere* 8
   Clasping apparatus never with heel-like prominence at postaxial junction of rami and horizontal ramus bearing no more than 6 teeth (including apical denticles). *Uncinocythere* 10
8. Some preapical teeth on horizontal ramus of clasping apparatus plate-like and protruding slightly beyond pre- and postaxial borders . . . . . ***Entocythere prisma***
   Preapical teeth on horizontal ramus of clasping apparatus acute to subacute and none protruding beyond postaxial border 9
9. Junction of rami of clasping apparatus produced in postaxial heel-like

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prominence and almost always bearing pouch-like projection mesially ..... ***Entocythere elliptica***

Junction of rami of clasping apparatus never produced in postaxial heel-like prominence and lacking pouch-like projection mesially ..... ***Entocythere dorsorotunda***

10. Apex of horizontal ramus of clasping apparatus with 2 denticles ..... ***Uncinocythere equicurva***

Apex of horizontal ramus of clasping apparatus with 3 denticles ..... ***Uncinocythere simondsi***

Genus *Ankylocythere* Hart, 1962

Ankylocythere ancyla (Crawford)

FIGURES 3*a*, 4, 5

Entocythere hobbsi Hoff, 1944:352 [in part, paratypic male in USNM].—?Crawford, 1959:150, 151, 156, 173, 177, 178, 180, 181.

Ankylocythere ancyla Crawford, 1965:148, 149, 153, figs. 1–3, 6, 7 [Type-locality: "... in the city limits of Greensboro, Guilford County, North Carolina." Types: holotype, allotype, morphotype, and dissected male paratype, USNM; paratypes in collections of F.A. Crawford, Jr., and USNM. Host: *Cambarus latimanus* (LeConte, 1856) (= *Cambarus (Depressicambarus) catagius* Hobbs and Perkins, 1967)].—Hart and Hart, 1974:20–22, pl. 1: figs. 1–6; pl. XLV.—Peters, 1974:74; 1975:iii, 5, 7, 8, 10, 13, 19, 22, 28–31, 33, 34, 45, figs. 2a, 10.—Hobbs and Peters, 1977:2–7, 9–12, 16–19, 21, 29, 31, 33, 36, 38, 40, 43, 44, 46, 49, 50, 52–54, 60, 61, 64, fig. 3, map 3.—Hobbs III, 1978:506.—Hobbs, 1981:312, 337, 344, 350, 356, 399, 403, 444, 450, 498, 501.

Ankylocythere hobbsi.—Hobbs, 1966:70 [in part].—Hart and Hart, 1974:28 [in part: Alamance Co., N.C. (see next reference) and ?Richland Co., S.C.].—Hobbs and Peters, 1977:13.

DISCUSSION.—An explanation for parts of the above synonomy is needed. Among the type specimens of *Entocythere hobbsi* in the collection of the Smithsonian Institution, the paratypic male is clearly a member of *Ankylocythere ancyla* Crawford (cf. figs. 4*m* and 8*b–j*). Because in Crawford's (1959:151) key to the ostracods of Richland County, South Carolina, he included "talon divided into long dorsal and short ventral projections" as a feature of his *E. hobbsi*, we suspect that some or all of his specimens assigned to this species are members of *An. ancyla*, the only member of the genus that possesses a divided talon. Thus the references to *E. hobbsi* cited by him in Richland County, South Carolina (pp. 156, 177) and repeated by Hart and Hart (1974:28) for *An. hobbsi* are questionably listed here for both species. Some of the host species included by Hobbs (1966) are based on Crawford's two records and consequently they, too, must be questioned.

DIAGNOSIS.—Shell length of males 315–399 ($\bar{x}$ = 354) μm; shell height 175–245 ($\bar{x}$ = 199) μm. Shell subovate lacking emarginations and prominences. Peniferum distinctly excavate ventrally with acute antero- and posteroventral angles. Vertical ramus of clasping apparatus longer than horizontal ramus and with pre- and postaxial borders entire; horizontal ramus with single tooth on preaxial border at or slightly proximal to midlength of ramus, and postaxial border with comparatively long, curved talon reaching to or beyond midway between preaxial tooth and apex of ramus; talon sometimes bearing tubercle extending ventrally or ventrodistally from near base, and tip of talon often curved mesially. Apex of ramus with 2 denticles.

RANGE.—"Along the Atlantic and Gulf slopes from the Mobile River drainage in Alabama and Mississippi northeastward to the Potomac drainage in Virginia and in the New River Basin of North Carolina" (Hobbs and Peters, 1977:18).

SOUTHEASTERN GEORGIA RECORDS.—This ostracod is so widespread in southeastern Georgia that the localities at which it has been collected are not cited; rather, the number of localities in each county is noted in parentheses and the hosts and entocytherid associates are presented in Tables 2 and 3. SAVANNAH BASIN: Burke (1), Effingham (1), Screven (5). OGEECHEE BASIN: Bryan (7), Bulloch (8), Burke (4), Candler (2), Chatham

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FIGURE 3.—Shells of entocytherids of southeastern Georgia (all from males except *j*): *a*, *Ankylocythere ancyla*, 1.1 mi (1.8 km) W of Wayne Co line on St Rte 99, Appling Co; *b*, *An. freyi*, Savannah River Bluff 6.8 mi (10.9 km) ENE of Kildare, Effingham Co; *c*, *An. hobbsi*, 3.6 mi (5.8 km) S of Telfair Co line on US Hwy 441, Coffee Co; *d*, holotype of *An. spargosis*, 7.9 mi (12.6 km) W of US Hwy 17 on St Rte 67, Bryan Co; *e*, *An. tiphophila*, Ogeechee River at St Rte 119, Effingham Co; *f*, *Uncinocythere equicurva*, 2.6 mi (4.2 km) NW of US Hwy 441 on St Rte 338, Laurens Co; *g*, *U. simondsi*, ditch 2.3 mi (3.7 km) S of Woodbine on US Hwy 17, Camden Co; *h*, *Entocythere elliptica*, ditch 1.1 mi (1.8 km) W of Wayne Co line on St Rte 99, Appling Co; *i*, *E. dorsorotunda*, ditch about 15.4 mi (24.6 km) S of Fargo on US Hwy 441, Clinch Co; *j,k*, allotype and holotype, respectively, of *E. prisma*, Goose Run Creek 7.7 mi (12.3 km) NW of McIntosh Co line on St Rte 99, Long Co; *l*, *Dactylocythere striophylax*, Salter Branch 1.4 mi (2.2 km) W of Bartow on St Rte 242, Jefferson Co.

(2), Effingham (2), Evans (2), Jenkins (1), Long (1), Screven (1), Tattnall (1). NEWPORT BASIN: Bryan (1), Liberty (3). ALTAMAHA BASIN: Emanuel (2), Johnson (1), Laurens (12), Long (1), Lyons (5), McIntosh (1), Montgomery (5), Tattnall (2), Treutlen (1), Wayne (8), Wheeler (2). SATILLA BASIN: Atkinson (3), Appling (2), Bacon (2), Camden (2), Coffee (4), Pierce (2), Ware (1), Wayne (4). SUWANNEE BASIN: Ben Hill (1), Berrien (3), Clinch (3), Echols (1), Lanier (3).

This ostracod has been found in collections from southeastern Georgia containing 24 species of crayfishes (see Table 2), and is known to infest 17 of them. The number of times the crayfish was present in collections containing *An. ancyla* is noted in parentheses: *C. (D.) latimanus* (3), *C. (D.) striatus* (1), *F. clypeata* (1), *P. (H.) advena* (16), *P. (H.) caritus* (10), *P. (H.) pygmaeus* (7), *P. (H.) talpoides* (16), *P. (H.) truculentus* (3), *P. (L.) barbatus* (24), *P. (L.) p. pubischelae* (14), *P. (L.) p. deficiens* (15), *P. (O.) a. acutus* (6), *P. (O.) enoplosternum* (23), *P. (O.) epicyrtus* (7), *P. (O.) litosternum* (10), *P. (O.) lunzi* (6), *P. (O.) pubescens* (2), *P. (O.) seminolae* (31), *P. (S.) howellae* (2), *P. (S.) paeninsulanus* (1), *P. (S.) troglodytes* (14).

REMARKS.—In southeastern Georgia, clearly *An. ancyla* is associated with a greater number of crayfishes belonging to the genus *Procambarus* than to those assigned to *Cambarus*, but there are many more species in the area belonging to the

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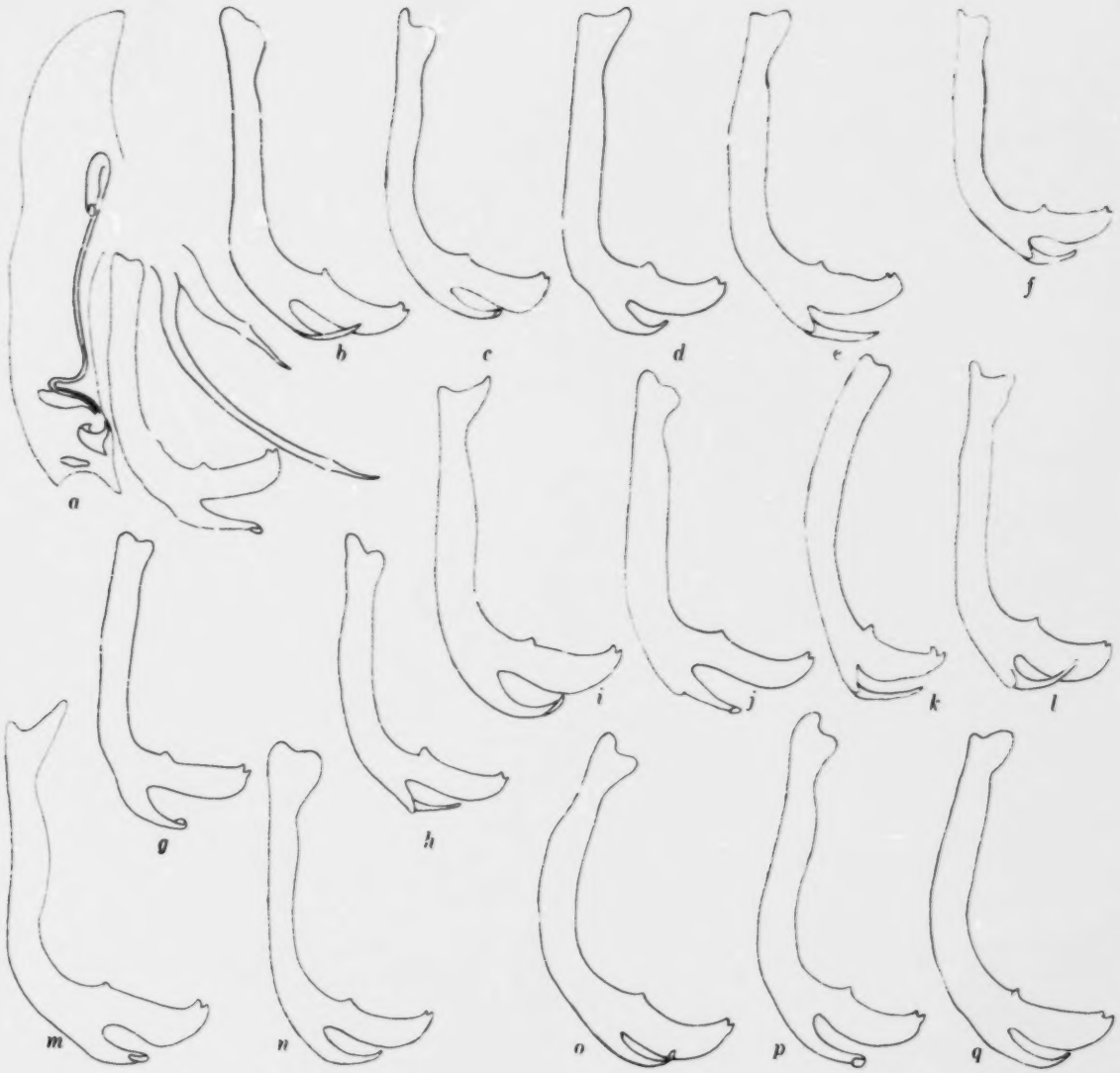

FIGURE 4.—*Ankylocythere ancyla* (*a*, copulatory complex of male; *b–q*, distal part or entire clasping apparatus of male): *a*, ditch 0.7 mi (1.1 km) E of Rte S605 on S1419, Wayne Co; *b,c*, ditch 2.5 mi (4 km) W of St Rte 24, Burke Co; *d,e*, 5.1 mi (8.2 km) W of Waynesboro on St Rte 24, Burke Co; *f*, 4 mi (6.4 km) SW of US Hwy 341 on Hwy 221, Jeff Davis Co; *g*, 0.7 mi (1.1 km) E of Rte S605 on S1419, Wayne Co; *h*, ditch 3.1 mi (5 km) W of Appling Co line on St Rte 99, Bacon Co; *i*, Jacks Creek at Lexsy on US Hwy 1, Emanuel Co; *j*, creek 9.6 mi (15.4 km) S of Millen on US Hwy 25, Jenkins Co; *k*, Sapelo Island, McIntosh Co; *l*, ditch 4.9 mi (7.8 km) SE of Eulonia on St Rte 99, McIntosh Co; *m*, paratype of *An. hobbsi* (= *An. ancyla*) from "Georgia" (in Smithsonian Collection); *n*, 0.4 mi (0.6 km) SE of Jeff Davis Co line on US Hwy 221, Coffee Co; *o*, 3.5 mi (5.6 km) N of Claxton on US Hwy 301, Evans Co; *p*, ditch 3.5 mi (5.6 km) N of Florida line on US Hwy 441, Echols Co; *q*, 1.4 mi (2.2 km) W of White Oak on St Rte 252, Camden Co.

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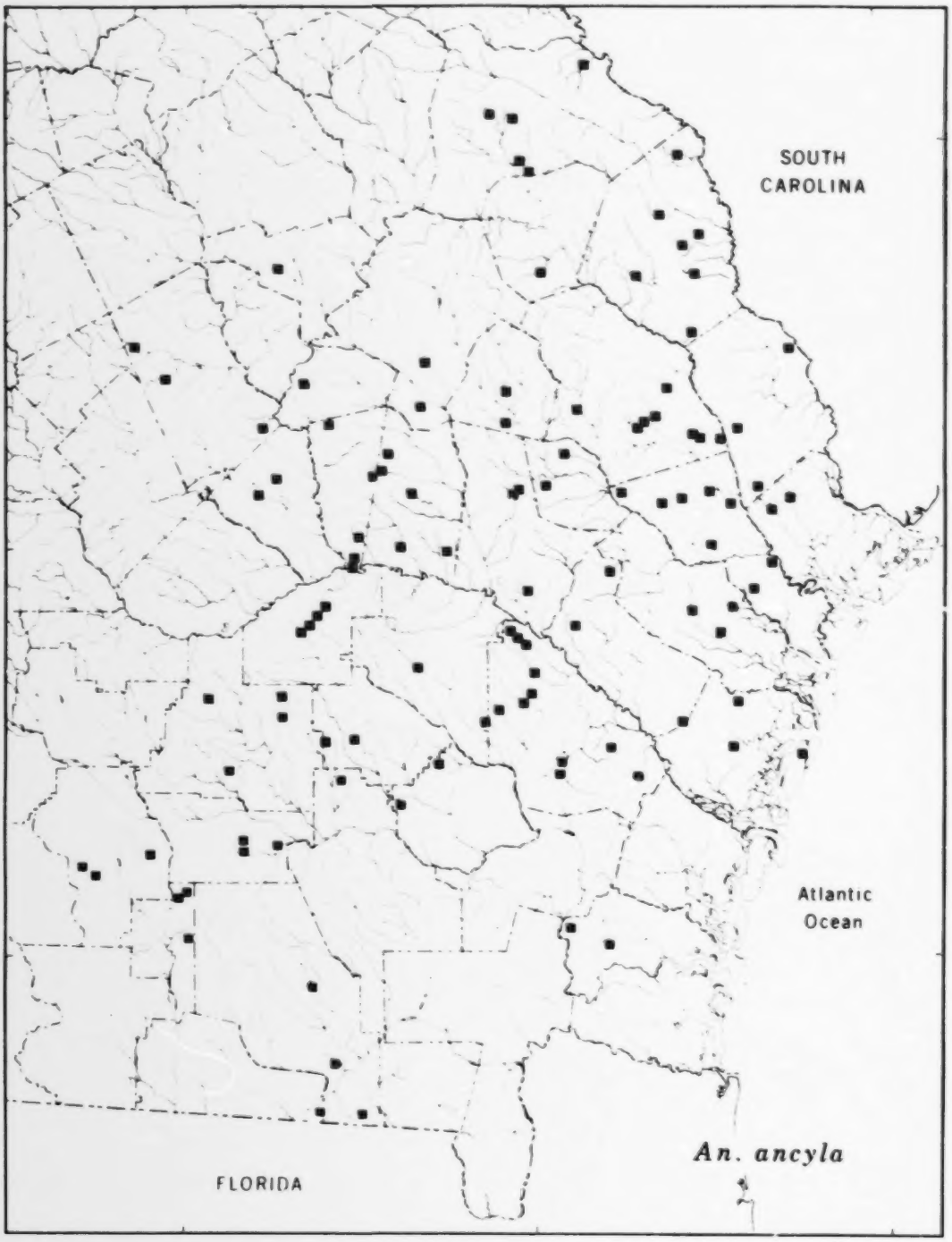

FIGURE 5.—Distribution of *Ankylocythere ancyla* in southeastern Georgia.

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former genus than to other genera. A perusal of the list of hosts and of the distribution of *An. ancyla* in Virginia (Peters, 1975) and in North Carolina (Hobbs and Peters, 1977) will provide convincing evidence that this ostracod would probably find almost any crayfish within its range to be an acceptable host. Furthermore, it seems equally indiscriminate in locating a congenial habitat, for within its range it infests crayfishes that frequent such contrasting environments as cascading mountain streams, lowland brooks, and temporary pools in swampy areas, and it obviously thrives on crayfishes that spend virtually their entire lives in, or in the vicinity of, burrows.

Comparing the size of the shells of this ostracod in specimens from throughout the range of the species, the smallest individuals occur in the area under investigation and the largest in the northernmost segment (average length and height in parentheses):

Author	*Length in μm*	*Height in μm*	*Geographic area*
Peters (1975)	380–440 (410)	220–270 (240)	southern Virginia
Crawford (1965)	345–390 (367)	225–240 (234)	North Carolina
Hobbs and Peters (1977)	350–430 (400)	200–250 (220)	North Carolina
Herein	315–399 (354)	175–245 (199)	S.E. Georgia

The only variations of note observed by us among specimens from this part of Georgia are in the clasping apparatus of the male, and these are illustrated in Figure 4. None of the variations seems to be limited to animals inhabiting one or more drainage basins, associated with restricted ecological conditions, or infesting certain hosts. Some of them have been observed in specimens from North Carolina (see fig. 3 in Hobbs and Peters, 1977).

Ankylocythere freyi Hobbs III

FIGURES 3*b*, 6, 7

Ankylocythere freyi Hobbs III, 1978:506, fig. 4 [Type-locality: burrows along Little Patsaligo Creek on State Route 10, 7.7 miles (12.4 km) E of Butler Co line, Crenshaw County, Alabama. Types: holotype and allotype, USNM; paratypes, USNM, D.J. Peters, and H.H. Hobbs III. Host: *Cambarus (L.) diogenes diogenes*.]

DIAGNOSIS.—Shell length of male 294–378 ($\bar{x}$ = 329) μm; shell height 168–210 ($\bar{x}$ = 186) μm. Shell subovate lacking emarginations and prominences. Peniferum (Figure 6*a*) distinctly excavate ventrally with subacute to acute antero- and posteroventral angles. Vertical ramus of clasping apparatus longer than horizontal ramus and with pre- and postaxial borders entire; horizontal ramus with single tooth on preaxial border slightly proximal to midlength, and postaxial border with comparatively slender talon arising on level proximal to tooth on preaxial border and disposed distally subparallel to ramus, its tip often deflected laterally; apex of clasping apparatus with 2 denticles.

RANGE.—The Escatawpa River basin, Alabama, eastward to the Satilla and Savannah river basins in Georgia.

SOUTHEASTERN GEORGIA RECORDS.—SAVANNAH BASIN. Burke County: (1) burrows along Newberry Creek at River Road, 1.6 mi (2.6 km) SE of St Rte 80 (host: *C. (D.) reflexus;* associates: *An. ancyla, An. hobbsi*). Chatham County: (2) roadside ditch 3.2 mi (5.1 km) SSW of Bloomingdale (hosts: *P. (L.) barbatus, P. (O.) lunzi;* associate: *An. ancyla*). Effingham County: (3) seepage along Savannah River Bluff 0.2 mi (0.3 km) NW of St Rte 119 (see Hobbs, 1981: fig. 8c) (host: *C. (D.) reflexus;* no associate). (4) Savannah River Bluff 6.8 mi (10.9 km) ENE of Kildare (host: *C. (D.) reflexus;* no associate). (5) 6.7 mi (10.7 km) NW of Clyo (host: *C. (D.) reflexus;* no associate).

ALTAMAHA BASIN. Bleckley County: (6) 7.9 mi (12.6 km) S of Twiggs Co line on US Hwy 129 (Hart and Hart, 1974:30, as *An. sinuosa* (Rioja, 1942)) (hosts: *F. clypeata, P. (S.) howellae;* no associate).

SATILLA BASIN. Jeff Davis County: (7) 7.5 mi (12 km) SW of Hazelhurst on US Hwy 221 (host: *P. (O.) seminolae;* associates: *An. spargosis, E. ellip-*

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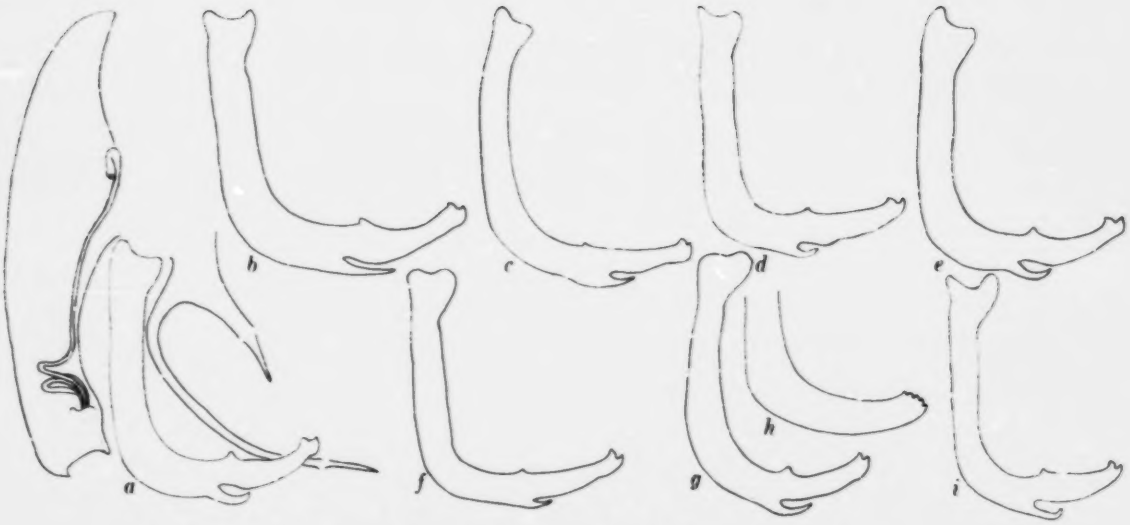

FIGURE 6.—*Ankylocythere freyi*: *a*, copulatory complex of holotype; *b–i*, clasping apparatus of male, (*g–i*, tentatively assigned to this species). Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a,d,e*, Effingham, 4; *b*, Burke, 1; *c*, Jeff Davis, 7; *f*, Chatham, 2; *g,h*, 1.9 mi (3 km) S of Pembroke on St Rte 119, Bryan Co (abnormal pair from same animal); *i*, 0.4 mi (0.6 km) SE of Jeff Davis Co line on US Hwy 221, Coffee Co.

tica). Wayne County: (8) roadside ditch 0.8 mi (1.3 km) W of US Hwy 82 on St Rte 99 (host: *P. (H.) talpoides;* associates: *An. hobbsi, E. dorsorotunda*).

REMARKS.—Of the entocytherids that are known to occur in southeastern Georgia *An. freyi* is most closely allied to *An. tiphophila* from which it differs most conspicuously in the distinctly excavate ventral end of the peniferum and in the disposition of the talon, which is directed distally subparallel to the horizontal ramus of the peniferum.

The slight variations that we have noted in the copulatory complex of the male of this ostracod are depicted in Figure 6. For the most part, specimens from southeastern Georgia differ very little from those reported by Hobbs III (1978) (the males are a little shorter and more highly vaulted); however, in the first locality listed the specimens are distinctly longer (male, 378 μm; females 441, 448 μm) than are any others from localities in either Georgia or Alabama.

Perhaps reflecting a penchant for subterranean habitats, almost all of the known specimens of this entocytherid were obtained from hosts removed from burrows: *C. (L.) diogenes diogenes, C. (D.) striatus, P. (L.) shermani* Hobbs, 1942, *P. (O.) acutissimus*, and *F. (C.) byersi* (Hobbs, 1941), reported from Alabama by Hobbs III (1978: 508), and *C. (D.) reflexus, P. (H.) caritus, P. (L.) barbatus, P. (L.) pubischelae deficiens*, and *P. (O.) lunzi* (reported here). In localities 6 and 7 the hosts were taken from open water, and the identification of the single specimen from locality 6 is questionable. The locality should be confirmed.

Whereas Hobbs III found this ostracod to be associated with four others belonging to the genera *Ankylocythere, Entocythere, Hartocythere*, and *Uncinocythere*, in Georgia it shared its hosts with only two other species, *Ankylocythere ancyla* and *Entocythere elliptica*.

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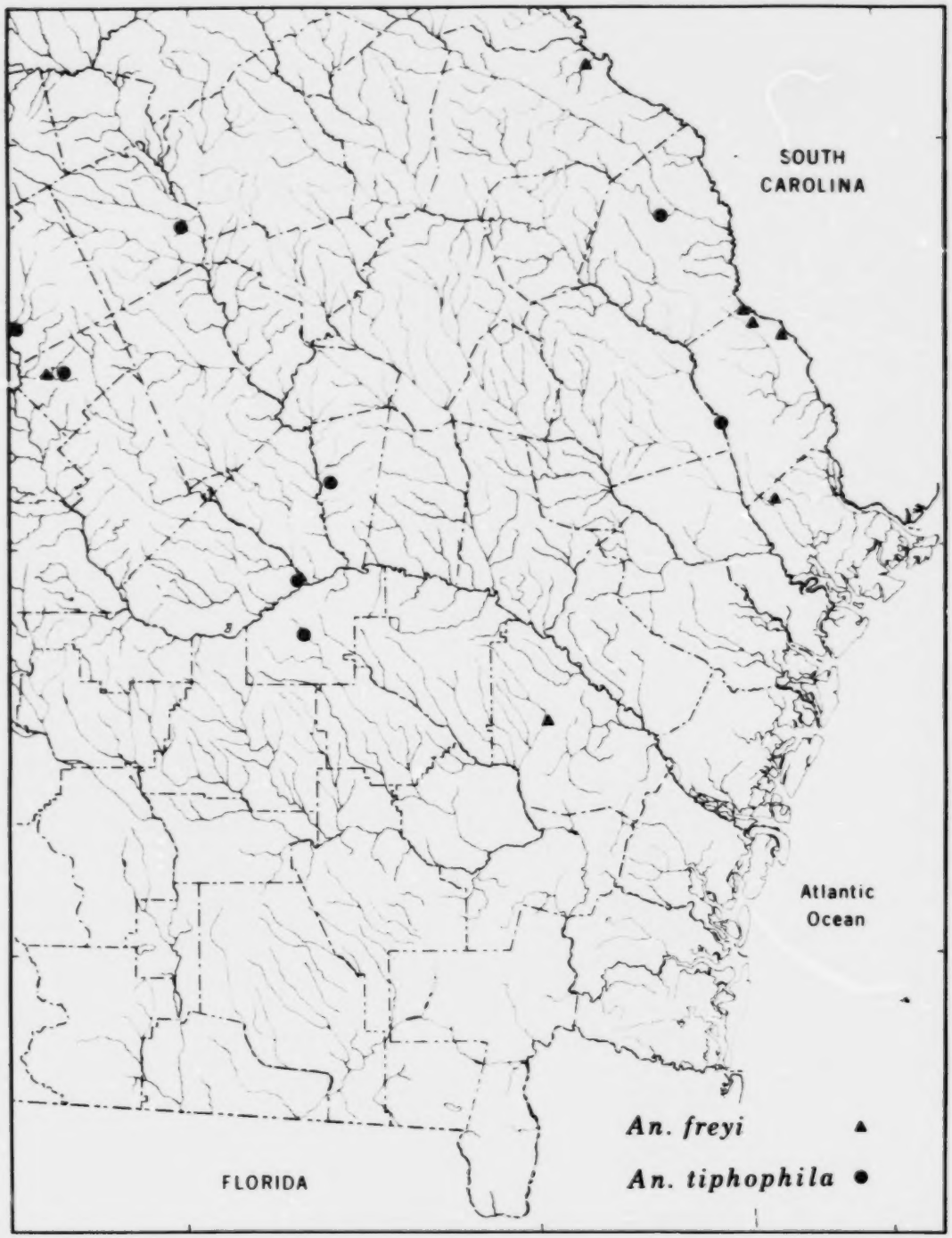

FIGURE 7.—Distribution of *Ankylocythere freyi* and *An. tiphophila* in southeastern Georgia.

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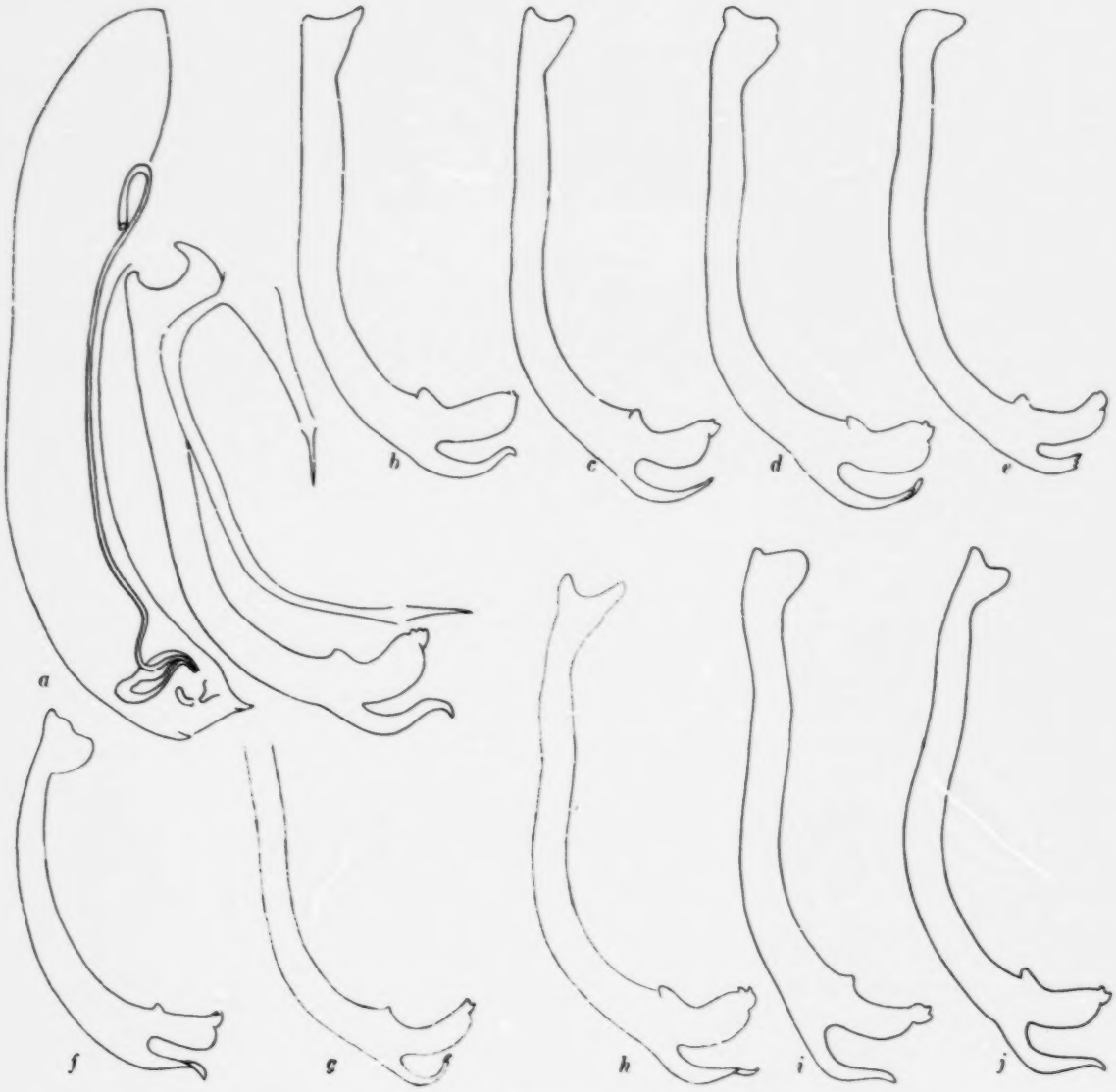

FIGURE 8.—*Ankylocythere hobbsi*: *a*, copulatory complex of male; *b–j*, clasping apparatus of male. Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a,h*, holotype, Ben Hill, 32; *b*, Wilcox, 40; *c*, Cook, 5.6 mi (9 km) N of Hahira on St Rte 41 (extra limital); *d*, Wayne, 28; *e,f*, Appling, 10; *g*, Dodge, 3; *i*, Laurens, 9; *j*, Burke, 1.

Ankylocythere hobbsi (Hoff)

FIGURE 3*c*, 8, 9

Entocythere hobbsi Hoff, 1944:330, 332, 352–356 [in part, except for paratypic male in Smithsonian Institution], figs. 26–33 [Type-locality: Crayfish burrows near Fitzgerald, Ben Hill County, Georgia. Types: holotype, allotype, and paratype, USNM. Host: *Procambarus advena* (LeConte, 1856) (= *P. (Hagenides) talpoides* Hobbs, 1981)].—Tressler, 1947:705; 1959:732, fig. 28.194.—Rioja, 1949:328.—(?)Crawford, 1959:151, 173, 178, 180,

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181.—Hart, 1959:193, 194, 202, 203, figs. 17–19.—Walton and Hobbs, 1959:115.—Hobbs, 1981:431.

Ankylocythere hobbsi.—Hart, 1962:127.—Crawford, 1965: 149.—Hobbs, 1966:70 [in part], 72, fig. 11; 1981:312, 344, 431, 499 [in part], 500 [in part], 501.—Hart and Hart, 1974:15, 20, 26–28 [in part], pl. III: figs. 1–3, pl. XLV [in part].—Hobbs and Peters, 1977:2, 3, 18.

DISCUSSION.—Because of Crawford's (1959: 151) reference to a divided talon as a characteristic of this ostracod, we suspect that his records (those for South Carolina which were cited again by Hart and Hart (1974:28)) are based upon misidentifications of specimens of *An. ancyla*. The talon of this species indeed often bears a "basal tubercle" (see Hobbs and Peters, 1977:18, fig. 3c,d) that perhaps prompted Crawford to describe the "Talon divided into long dorsal and short ventral projections." If this assumption is correct, some of the hosts listed by Hobbs (1966:70) that were taken from Crawford's list (p.181): *Cambarus acuminatus* Faxon (1884), *C. latimanus* (LeConte, 1856), *C. reduncus* Hobbs (1956), *C. uhleri* (Faxon, 1884) (= *F. uhleri*), *Procambarus ancylus* Hobbs (1958) (= *P.* sp., Crawford), *P. enoplosternum* Hobbs (1947) and *P. troglodytes* (LeConte, 1856) should be questioned, and that they do harbor this ostracod must be confirmed. We examined the specimens on which Hart and Hart (1974:28) based their North Carolina record and believe them to be members of *An. ancyla*.

DIAGNOSIS.—Shell length of male 357–427 ($\bar{x}$ = 397) μm; shell height 196–252 ($\bar{x}$ = 223) μm. Peniferum very weakly excavate ventrally with acute antero- and posteroventral angles. Vertical ramus of clasping apparatus at least twice as long as horizontal ramus and with pre- and postaxial margins entire; horizontal ramus very short, bearing single tooth on preaxial margin near base of ramus; postaxial margin of ramus with long curved or twisted talon reaching distinctly distal to midway between tooth and apex of ramus, often almost as far as apex; two apical denticles set off from horizontal ramus by preapical constriction on postaxial margin (position of clasping apparatus sometimes obscuring constriction).

RANGE.—From Orange County, Florida, northward to the lower Ocmulgee-Oconee, Ogeechee, and Savannah basins, Georgia, and Coosawhatchee Basin, South Carolina. If the localities in Richland County, South Carolina, mentioned above prove to be based on this species, then they mark the northernmost limit of the known range of this ostracod.

SOUTHEASTERN GEORGIA RECORDS.—SAVANNAH BASIN. Burke County: (1) crayfish burrows along Newberry Creek 1.6 mi (2.4 km) SE of St Rte 80 on River Rd (host: *C. (D.) reflexus;* associates: *An. ancyla, An. freyi*).

NEWPORT BASIN. Bryan County: (2) ditch 1.0 mi (1.6 km) W of Richmond Hill (host: *P. (S.) troglodytes;* associates: *An. ancyla, An. spargosis, E. elliptica, E. prisma*).

ALTAMAHA BASIN. Dodge County: (3) ditch 1.2 mi (1.9 km) S of Laurens Co line on US Hwy 441 (hosts: *F. clypeata, P. (H.) caritus, P. (S.) howellae;* no associates). Telfair County: (4) ditch 6.7 mi (10.7 km) WSW of US Hwy 341 on US Hwy 280 (host: *P. (H.) caritus;* associate: *E. elliptica*). (5) ditch 6.2 mi (9.9 km) W of US Hwy 441 on US Hwy 280 (hosts: *F. clypeata, P. (H.) caritus, P. (S.) howellae;* associates: *E. elliptica, E. prisma*). Toombs County: (6) ditch 3.1 mi (5 km) W of Tattnall Co line on St Rte 292 (hosts: *P. (H.) advena, P. (S.) howellae;* no associates). Wayne County: (7) ditch 5.0 mi (8 km) E of Odum on St Rte 27 (host: *P. (H.) talpoides;* associate: *E. dorsorotunda*). (8) ditch 0.4 mi (0.6 km) W of Broadhurst on Rte S1920 (host: *P. (H.) caritus;* no associates). Wheeler County: (9) ditch 3.7 mi (5.9 km) W of Glenwood on US Hwy 280 (Hart and Hart, 1974:28) (hosts: *F. clypeata, P. (H.) caritus* (not *P. (H.) advena*), *P. (S.) howellae;* associate: *E. dorsorotunda* ?).

SATILLA BASIN. Appling County: (10) ditch 3.0 mi (4.8 km) S of Baxley on US Hwy 1 (host: *P. (H.) caritus;* associates: *An. ancyla, E.* sp., *U. simondsi*). Atkinson County: (11) ditch 3.8 mi (6.1 km) W of Ware Co line on US Hwy 82 (hosts: *P. (H.) talpoides, P. (L.) p. pubischelae;* associate: *E. elliptica*). (12) ditch 0.2 mi (0.3 km) SW of US Hwy 221 on St Rte 64 (hosts: *P. (L.) p. pubischelae, P. (O.) seminolae;* associate: *E. elliptica*). Bacon County: (13) ditch 2.9 mi (4.6 km) SW of Alma

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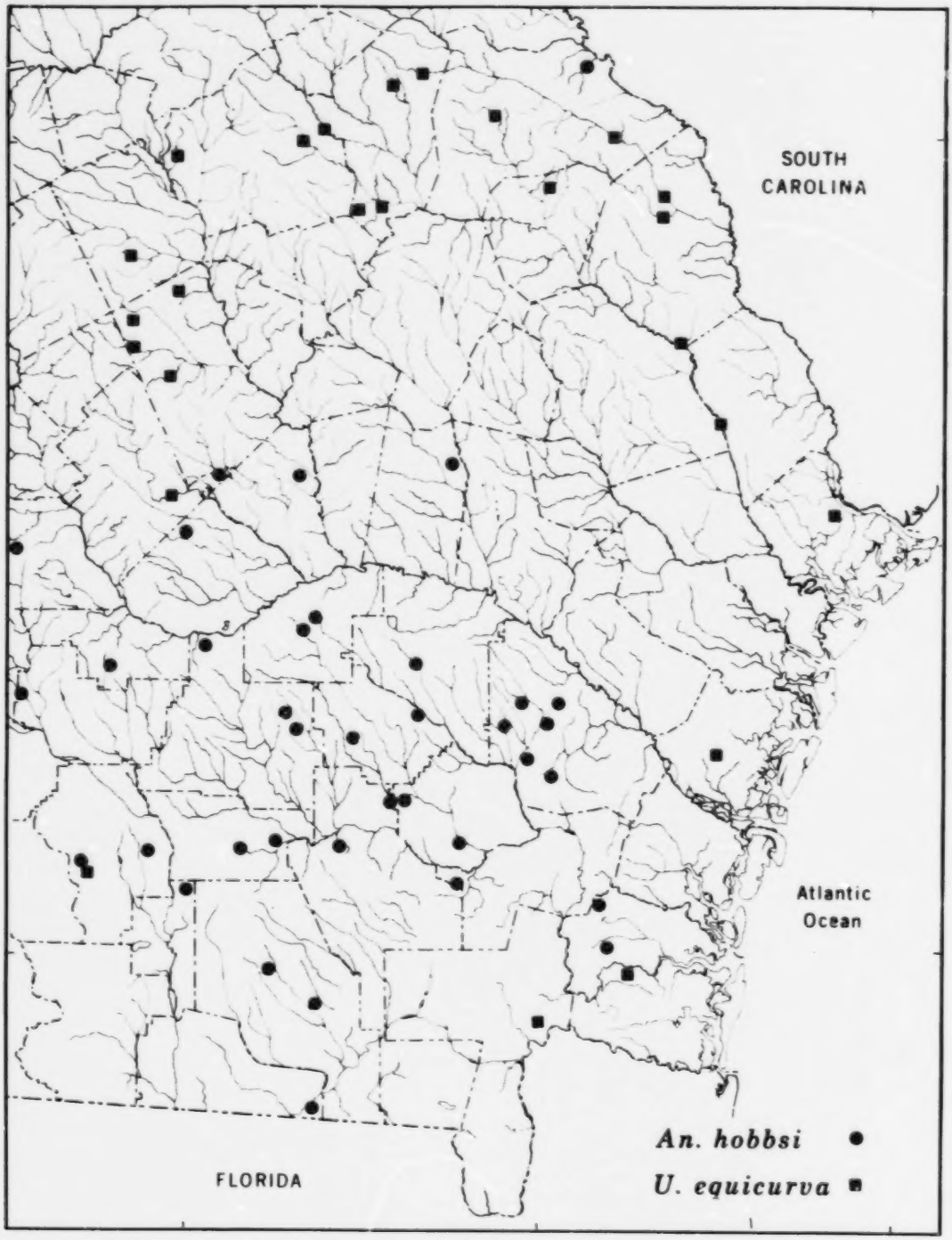

FIGURE 9.—Distribution of *Ankylocythere hobbsi* and *Uncinocythere equicurva* in southeastern Georgia.

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on St Rte 64 (host: *P. (H.) talpoides;* associate: *E. prisma*). (14) ditch 2.1 mi (3.7 km) W of Appling Co line on St Rte 99 (host: *P. (H.) talpoides;* no associate). Camden County: (15) ditch 1.2 mi (1.9 km) N of Rte S1850 on Rte S110 (host: *P. (H.) talpoides;* associate: *An. ancyla*). (16) ditch 1.4 mi (2.2 km) W of White Oak on St Rte 252 (host: *P. (H.) talpoides;* associates: *An. ancyla, E. dorsorotunda*).

Coffee County: (17) ditch 3.6 mi (5.8 km) S of Telfair Co line on US Hwy 441 (host: *P. (H.) caritus;* no associate). (18) ditch 1.8 mi (2.9 km) E of US Hwy 221 on Rte 1730 (hosts: *P. (H.) talpoides, P. (O.) seminolae,* associates: *An. ancyla, E. prisma*). (19) ditch 5.1 mi (8.2 km) SE of US Hwy 221 on Rte 1730 (hosts: *P. (H.) caritus, P. (H.) talpoides;* associate: *E. prisma*). Jeff Davis County: (20) Hazelhurst (hosts: *P. (H.) caritus, P. (L.) p. deficiens, P. (O.) seminolae;* associates: *An. ancyla, E. prisma*). (21) ditch 1.3 mi (2.1 km) SW of Hazelhurst on US Hwy 221 (hosts: *P. (H.) caritus, P. (L.) p. deficiens;* associate: *An. ancyla*).

Pierce County: (22) ditch 4.5 mi (7.2 km) E of Rte S1918 on Rte S598 (hosts: *P. (H.) talpoides, P. (L.) p. pubischelae;* associates: *An. ancyla, E. dorsorotunda, E. prisma*). (23) ditch 3.2 mi (5.1 km) SE of US Hwy 82 on St Rte 15 (host: *P. (H.) talpoides;* associate: *E. prisma*). Ware County: (24) ditch 14.6 mi (23.4 km) W of Waycross on US Hwy 82 (hosts: *P. (H.) talpoides, P. (L.) p. pubischelae;* no associate). (25) ditch 2.3 mi (3.7 km) S of US Hwy 1 on Rte S1918 (hosts: *P. (H.) talpoides, P. (O.) seminolae;* no associate). (26) ditch at Brantley Co line on US Hwy 84 (host: *P. (H.) talpoides;* no associate). Wayne County: (27) ditch just E of Rte S605 on S1491 (host: *P. (H.) talpoides;* no associate). (28) ditch 5.8 mi (9.3 km) W of US Hwy 82 on St Rte 99 (host: *P. (H.) talpoides;* associates: *E. dorsorotunda, E. prisma*). (29) ditch 1.8 mi (2.9 km) E of Screven on Rte S1920 (host: *P. (H.) talpoides;* no associate). (30) ditch 0.4 mi (0.6 km) W of Broadhurst on S1920 (host: *P. (H.) caritus;* no associate). (31) ditch 0.8 mi (1.3 km) W of US Hwy 82 on St Rte 99 (host: *P. (H.) talpoides;* associates: *An. freyi, E. dorsorotunda*).

SUWANEE BASIN. Ben Hill County: (32) crayfish burrows near Fitzgerald (Hoff, 1944:356) (host: *P. (H.) talpoides;* associate: *E. dorsorotunda*). Berrien County: (33) ditch 2.5 mi (4 km) W of St Rte 135 on Rte 76 (hosts: *P. (H.) talpoides, P. (L.) p. pubischelae;* no associates). (34) ditch 3.4 mi (5.4 km) NW of Nashville on St Rte 125 (hosts: *P. (H.) talpoides, P. (O.) seminclae;* associates: *An. ancyla, E.* sp.). Clinch County: (35) ditch 7.7 mi (12.4 km) S of Homerville on US Hwy 441 (hosts: *P. (H.) talpoides, P. (L.) p. pubischelae;* associate: *E. dorsorotunda*). (36) ditch and creek 15.4 mi (24.7 km) N of Fargo on US Hwy 441 (hosts: *P. (H.) pygmaeus, P. (H.) talpoides, P. (O.) seminolae;* associate: *E. dorsorotunda*). Echols County: (37) ditch 3.6 mi (5.8 km) S of Homerville on US Hwy 441 (host: *P. (H.) talpoides;* associate: *E. elliptica*). Irwin County: (38) Turner Co line at St Rte 32 (host: *P. (O.) seminolae;* associate: *E. elliptica*). Lanier County: (39) ditch 2.2 mi (3.5 km) W of Clinch Co line on St Rte 64 (host: *P. (H.) talpoides;* associates: *An. ancyla, E. dorsorotunda*). Wilcox County: (49) ditch 8.1 mi (13 km) N of Pitts on St Rte 215 (host: *P. (H.) talpoides;* associate: *E.* sp.)

REMARKS.—Discounting (perhaps erroneously) records of the presence of this species in Richland County, South Carolina, the range of *An. hobbsi* only slightly exceeds that of the crayfish subgenus *Hagenides* to which the most frequently infested hosts belong (see Hobbs, 1981, fig. 120). The ranges of *An. hobbsi* and its close relative *An. spargosis* are depicted in Figures 9 and 11 respectively, herein. Even though such a correlation of ranges exists, the hosts, as noted above, are not limited to the subgenus *Hagenides* but at the same time seem to be restricted to crayfishes belonging to the genus *Procambarus*. The only entocytherid other than *An. harmani* Hobbs (1966), *An. hobbsi,* and *An. spargosis* that bears a long talon is *An. ancyla*, which has a range that overlaps that of the last two and occasionally is found in the same locality with them. Isolation of three segments of a common stock resembling *An. ancyla* on (1) several surface-dwelling crayfishes, (2) the burrowing progenitors of *P. (H.) advena*, and on the burrowing ancestral stock of *P. (H.) talpoides* and *P. (H.) caritus* might well

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account for the origin of *An. ancyla*, *An. spargosis*, and *An. hobbsi*, respectively. For the most part, the ranges of the latter and of *An. spargosis* do not overlap, and in only one locality (in Bryan County) do the two occur syntopically. The presence there of *An. hobbsi* could well have resulted from an introduction by fishermen using the host *P. (S.) troglodytes* as bait.

As in most entocytherids, the variations noted are more apparent than real, for if series of specimens are available from a single locality, the differences that appear to exist between individuals almost always seem to result from the different positions assumed by the mounted specimens. Some of the variations noted in the diagnostic features of the clasping apparatus of the male are illustrated in Figure 8.

Ankylocythere spargosis, new species

FIGURES 3*d*, 10, 11

Ankylocythere hobbsi.—Hart and Hart, 1974:28, pl. XLV [in part: record for McIntosh County, Georgia].—Hobbs, 1981:312, 344, 499, 500 [in part: record for McIntosh County, Georgia].

DIAGNOSIS (based on male).—Shell length of males 350–420 ($\bar{x}$ = 388) μm; shell height 196–224 ($\bar{x}$ = 211) μm. Shell subovate, lacking emarginations or prominences. Peniferum very shallowly, if at all, excavate ventrally and with anteroventral extremity produced in short acute prominence; similar but distinctly smaller one usually evident on posteroventral extremity. Rami of clasping apparatus not clearly delimited: vertical ramus with margins entire, more than twice as long as horizontal ramus; latter with single strong tooth on preaxial margin near base, postaxial margin bearing long curved talon extending anteroventrally beyond midway between tooth and subtruncate distal extremity of ramus; distal part of ramus greatly expanded in dorsoventral plane, and 2 denticles usually discernible at dorsodistal extremity.

MALE.—Eye located between 0.25 and 0.20 shell length from anterior margin. Shell (Figure 3*d*) subovate with greatest height almost 0.50 shell length from posterior margin where about 1.4 times height at level of eye; margin entire. Submarginal setae sparse but more present antero- and posteroventrally than elsewhere.

Copulatory complex (Figure 10*a*) with peniferum long, almost uniformly slender ventral to spermatic loop; ventral extremity concave with subacute to acute prominences anteriorly and posteriorly; penis situated within ventral 0.2 length of peniferum. Clasping apparatus as described in "Diagnosis." Slender dorsal finger reaching to or beyond midlength of ventral finger; latter with short basal section directed posteroventrally, little more than half remainder and bending gently ventrally to anteroventrally, base of distal part more strongly curved, resulting in distal segment (including terminal seta) being directed more strongly anteriorly than ventrally.

FEMALE.—The female of this species has not yet been correlated with the male, and, assuming that we have examined specimens of it, we are unable to distinguish it from the females of closely allied species.

TYPE-LOCALITY.—Roadside ditch with flowing water, 7.9 miles (12.6 km) W of US Hwy 17 on St Rte 67, Bryan County, Georgia. The specimens were retrieved from a container in which *Procambarus (H.) pygmaeus*, *P. (L.) barbatus*, *P. (O.) lunzi*, and *P. (S.) troglodytes* had been preserved; entocytherid associates included members of *An. ancyla* and *E. prisma*.

DISPOSITION OF TYPES.—The type series consists only of those specimens from Bryan and Liberty counties, Georgia. The holotypic male is deposited in the National Museum of Natural History, Smithsonian Institution, USNM 213651. A paratypic male is on file in the British Museum (Natural History), and another in the personal collection of H.H. Hobbs III, Wittenberg University. The remaining paratypes are in the Smithsonian Institution.

RANGE.—*Ankylocythere spargosis* appears to have a restricted range within the area defined herein as southeastern Georgia: the coastal plain between the Savannah and Satilla river basins.

SOUTHEASTERN GEORGIA RECORDS (speci-

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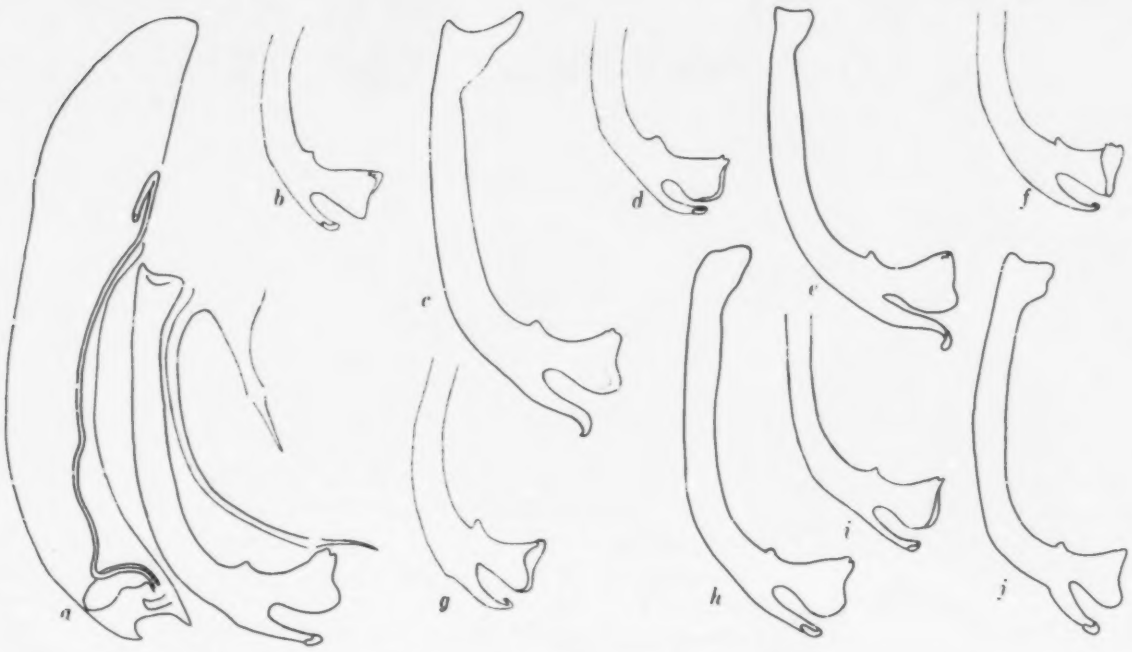

FIGURE 10.—*Ankylocythere spargosis: a*, copulatory complex of male; *b–j*, clasping apparatus of male. Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a*, holotype, Bryan, 4; *b*, Long, 8; *c*, Bryan, 3; *d,f,g*, Liberty, 7; *e*, McIntosh, 9; *h,i*, Effingham, 1; *j*, Jeff Davis, 10.

mens from all of the localities listed have been examined by us).—SAVANNAH BASIN. Effingham County: (1) Ebeneezer Creek 4.0 mi (6.4 km) N of Clyo on Rte S593 (hosts: *P. (H.) pygmaeus, P. (O.) epicyrtus;* associate: *E. elliptica*).

OGEECHEE BASIN. Bryan County: (2) creek and ditch 2 mi (3.2 km) S of Pembroke on St Rte 119 (hosts: *P. (H.) advena, P. (L.) barbatus, P. (O.) litosternum, P. (S.) troglodytes;* associates: *An. ancyla, An. hobbsi, E. elliptica, E. prisma*). (3) Mill Creek 1.2 mi (1.9 km) N of Ellabelle on Rte S623 (hosts: *P. (H.) pygmaeus, P. (L.) barbatus, P. (O.) epicyrtus;* associates: *An. ancyla, E. prisma*). (4) type-locality. (5) ditch 1.0 mi (1.6 km) W of Richmond Hill on St Rte 67 (host: *P. (O.) troglodytes;* associates: *An. ancyla, E. elliptica, An. hobbsi*).

MEDWAY-NEWPORT BASIN. Liberty County: (6) Raccoon Branch 2.0 mi (3.2 km) N of Fleming on Rte S1884 (hosts: *P. (H.) pygmaeus, P. (S.) troglodytes;* associates: *An ancyla, E. elliptica, E. prisma*). (7) creek 5 mi (8 km) SW of Wilderness Church on unnumbered rd (hosts: *P. (H.) pygmaeus, P. (S.) troglodytes;* no associate).

ALTAMAHA BASIN. Long County: (8) Goose Run Creek NW of McIntosh Co line on St Rte 99 (hosts: *P. (H.) pygmaeus, P. (O.) enoplosternum, P. (O.) lunzi;* associates: *E. elliptica, E. prisma*). McIntosh County: (9) Buffalo Creek 6.5 mi (10.4 km) W of US Hwy 17 on St Rte 251 (hosts: *P. (H.) pygmaeus, P. (O.) enoplosternum, P. (S.) troglodytes;* associates: *E. elliptica, E. prisma*).

SATILLA BASIN. Jeff Davis County: (10) Hurricane Creek 7.5 mi (12 km) S of Hazelhurst on US Hwy 221 (host: *P. (O.) seminolae;* associates: *An. freyi, E. elliptica*).

RELATIONSHIPS.—*Ankylocythere spargosis* shares with its closest relatives, *An. hobbsi, An. ancyla*, and *An. harmani* Hobbs (1966), a talon on the clasping apparatus of the copulatory com-

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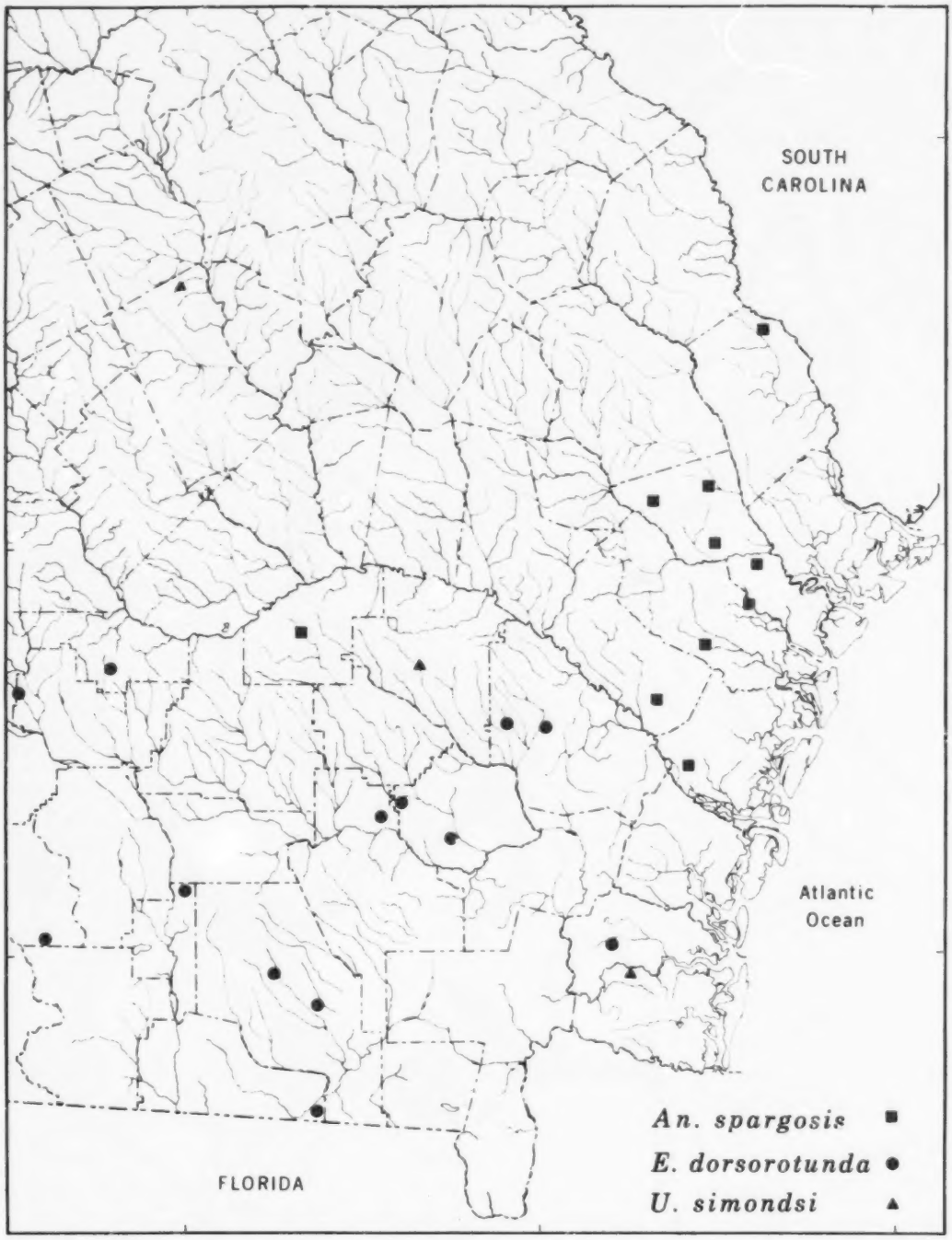

FIGURE 11.—Distribution of *Ankylocythere spargosis, Entocythere dorsorotunda,* and *Uncinocythere simondsi* in southeastern Georgia.

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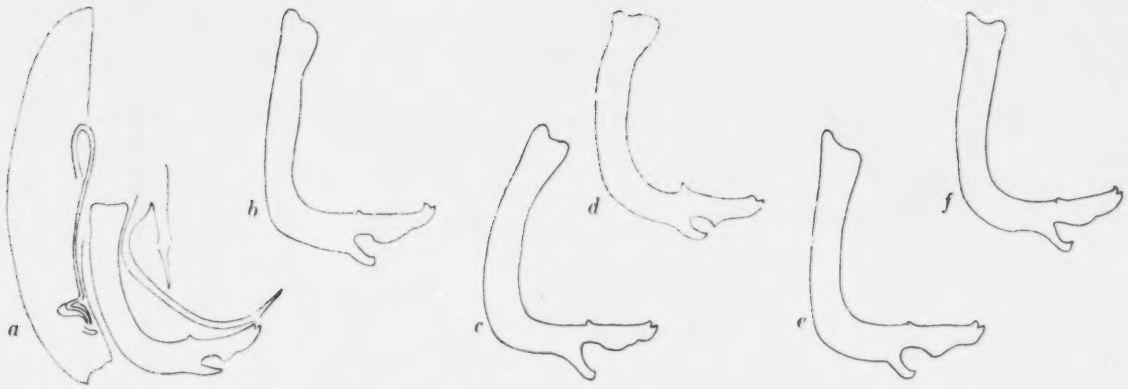

FIGURE 12.—*Ankylocythere tiphophilia: a,* copulatory complex of male; *b–f,* clasping apparatus of male. Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a,d,* Bleckley, 3; *b,* Wilkinson, 7; *c,* Montgomery, 0.4 mi (0.6 km) NE of Jeff Davis Co line on US Hwy 221; *e,* Telfair, 5; *f,* Effingham, 2.

plex that is distinctly longer than that in other members of the genus, and *An. hobbsi* and *An. spargosis* are unique in that the distal part of the horizontal ramus of the clasping apparatus appears swollen distoventrally. The "sweiling" is so extreme in *An. spargosis* that its distoventral extremity reaches almost as far anteriorly as do the dorsodistally-situated apical denticles. In *An. hobbsi,* the apical denticles always distinctly overreach the swelling, and also the copulatory complex is proportionately larger than that of *An. spargosis* (cf. Figures 8 and 10).

VARIATIONS.—The variations noted in this ostracod, as might be anticipated of a species occupying such a limited range, are hardly noteworthy, and most of the differences that are apparent in the illustrations (Figure 10) seem to be related to the angles at which the specimens were viewed rather than to real differences.

Ankylocythere tiphophila (Crawford)

FIGURES 3*e*, 7, 12

Entocythere tiphophila Crawford, 1959:173, figs. 31–37 [Type-locality: roadside ditch 9.1 miles (14.6 km) SE of the University of South Carolina stadium, Richland County, South Carolina, on St Rte 48. Types: holotype, allotype, and morphotype in USNM; paratypes, USNM, E.A. Crawford, Jr., H.H. Hobbs, Jr., C.C. Hoff, and E.N. Kozloff. Hosts: *Fallicambarus (C.) uhleri* and *Procambarus (S.) troglodytes.*]

Ankylocythere tiphophila.—Hart, 1962:128.—Peters, 1974:74; 1975:iii, 5–8, 10, 13, 20, 22, 23, 27, 45, figs. 2c, 6k, 14.—Hart and Hart, 1974:15, 20, 33, pl. IV: figs. 6–8, pl. XLV.—Hobbs and Peters, 1977:iii, 3–7, 9, 12, 16, 19–22, 28, 40, 41, 43, 46, 49–54, 70, fig. 5, map 5.—Hobbs, 1981:140, 499–501.—Hobbs and McClure, 1983:773.

Ankylocythere sinuosa.—Hart and Hart, 1974:30 [in part, Twiggs County].

DIAGNOSIS.—Shell length of males 301–336 ($\bar{x}$ = 321) μm; shell height 161–196 ($\bar{x}$ = 182) μm. Shell subovate lacking emarginations and prominences. Peniferum very shallowly excavate ventrally and with anteroventral angle distinctly acute. Vertical ramus of clasping apparatus with preaxial and postaxial margins entire and longer than horizontal ramus; latter with single tooth on preaxial margin slightly proximal to midlength, and postaxial margin with prominent talon arising proximal to, or at almost same level as, tooth on preaxial surface; talon disposed at angle of no less than 40 degrees to ramus, its tip often directed dorsally toward ramus; apex of clasping apparatus with 2 denticles.

RANGE.—"Lower Piedmont and Coastal Plain provinces from the Escambia River system in

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Florida northward to the York River Basin in Virginia. Hart and Hart (1974:33) also reported it from two localities in Ohio" (Hobbs and Peters, 1977:21).

SOUTHEASTERN GEORGIA RECORDS.—SAVANNAH BASIN. Screven County: (1) Beaverdam Creek at jct of US Hwy 301 (host: *P. (O.) pubescens;* associates: *An. ancyla, E. elliptica, U. equicurva*).

OGEECHEE BASIN. Effingham County: (2) Ogeechee River at St Rte 119 (hosts: *F. clypeata, P. (O.) enoplosternum, P. (S.) troglodytes;* associates: *E. elliptica, U. equicurva*).

ALTAMAHA BASIN. Bleckley County: (3) 7.9 miles (12.6 km) S of Twiggs Co line on US Hwy 129 (host: *P. (S.) howellae;* no associate). Montgomery County: (4) 8.3 mi (13.3 km) S of Treutlen Co line on US Hwy 221 (Hart and Hart, 1974:33) (host: *F. clypeata;* no associate). Telfair County: (5) N city limit of Lumber City on US Hwy 341 (Hart and Hart, 1974:33) (hosts: *F. clypeata, P. (S.) howellae;* no associate). Twiggs County: (6) 0.5 mi (0.8 km) SE of Houston Co line (Hart and Hart, 1974:30, as *An. sinuosa*) (host: *E. clypeata;* no associate). Wilkinson County: (7) 8.1 mi (13 km) E of Irwinton on St Rte 57 (Hart and Hart, 1974:33) (hosts: *C. (D.) truncatus, C. (L.) d. diogenes, F. clypeata, P. (O.) enoplosternum, P. (Pe.) spiculifer, P. (S.) howellae;* no associate).

REMARKS.—Hart and Hart (1974:33) recorded this ostracod, which was previously known only from Richland County, South Carolina, from a single locality in the Florida panhandle, three in southeastern Georgia, one in North Carolina (their Wake County record is mistakenly listed under Georgia), and two in Ohio. Concurrently, Peters (1974, fig. 14) noted its occurrence in 14 localities in the James River basin of Virginia. The most recently recorded localities are those cited by Hobbs and Peters (1977:21): 17 localities in the Piedmont and Coastal Plain provinces of North Carolina between and including the North and Pee Dee rivers.

The lower limit in size of the specimens from the area under consideration falls below that reported by previous authors. The ranges reported by Crawford (1959) and Hart and Hart (1974) are identical and the size is smaller than that reported by Peters for specimens from southeastern Virginia and by Hobbs and Peters for others from North Carolina. Some of the specimens from southeastern Georgia are distinctly smaller than the least of those from Virginia and North Carolina, whereas the upper limit of the range overlaps the lower segment of the range reported for central South Carolina. Thus members of the species occupying the southern part of the range are smaller than are those occurring farther north, and a cline with respect to size is suggested by the intermediate size of specimens from Richland County, South Carolina, reported by Crawford:

Author	*Length in μm*	*Height in μm*	*Geographic Area*
Crawford (1959)	330–350 (346)	180–210 (198)	South Carolina
Hart and Hart (1974)	330–350 (350)	180–210 (200)	?
Peters (1975)	380–400 (390)	190–220 (200)	S.E. Virginia
Hobbs and Peters (1977)	390–430 (410)	180–220 (200)	North Carolina
Herein	301–336 (321)	161–196 (182)	S.E. Georgia

The configuration of the copulatory complex of the male is remarkably uniform throughout the range of the species, and the few differences noted may well reflect nothing more than the angle assumed by the complex when the specimens were mounted.

Of the several possible hosts that were infested with this ostracod in southeastern Georgia, only *Faxonella clypeata, Procambarus (O.) seminolae,* and *P. (S.) howellae* are known with certainty to harbor it. In this area it has been found in both lentic and lotic habitats, and considering the habits of the hosts and those of the ostracod in North Carolina and Virginia, in all probability it does not shun crayfishes dwelling in burrows.

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Genus *Dactylocythere* Hart, 1962

Dactylocythere striophylax (Crawford)

FIGURES 31, 13, 14

Entocythere striophylax Crawford, 1959:150, 151, 157–162, 179, 180, 181, figs. 10–17 [Type-locality: Cedar Creek, 9.6 miles (15.4 km) NNW of Columbia city limits on St Rte 215, Richland County, South Carolina. Types: holotype, allotype, morphotype, and paratype, USNM 103563–103566, respectively; paratypes E.A. Crawford, Jr, C.C. Hoff, E.N. Kozloff. Hosts: *Cambarus (C.) b. bartonii, C. (D.) latimanus, C. (P.) spicatus, Procambarus (O.) a. acutus*].

Dactylocythere striophylax Hart, 1962:131.—Hart and Hart, 1974:15, 46, 60, 71, pl. XXI: figs. 1–5, pl. XLVIII.—Hobbs and Peters, 1977: iii, 3, 5–7, 10–12, 21, 26, 29, 40, 41, 43, 45, 52, 55, 64, fig. 19, map 8.

Dactylocythere striphylax.—Hart and Hart, 1974:64 [erroneous spelling].

DIAGNOSIS.—Shell length of male 490–511 ($\bar{x}$ = 500) μm; shell height, 266–301 ($\bar{x}$ = 283.5) μm. Shell subovate, lacking emarginations and prominences. Copulatory complex of male with trilobed finger guard. Peniferum with posteroventral extremity rounded; accessory groove reaching dorsally to or slightly above dorsal extremity of spermatic loop. Vertical ramus of C-shaped clasping apparatus subequal in length to horizontal ramus and with pre- and postaxial margins entire; horizontal ramus with 0 to 3 teeth evident along distal third of preaxial margin and with 3 apical denticles, postaxial margin entire.

RANGE.—From the Ogeechee Basin in Georgia northward to the Pee Dee and French Broad watersheds in North Carolina.

SOUTHEASTERN GEORGIA RECORDS.—SAVANNAH BASIN. Screven County: (1) Creek 5.0 mi (8 km) S of Burke Co line on Rte S1321 (hosts: *Cambarus (D.) latimanus, P. (O.) enoplosternum*; associates: *An. ancyla, E. elliptica*).

OGEECHEE BASIN. Bulloch County: (2) Ogeechee River Bluff 3.9 mi (6.2 km) ENE of Stilson (host: *C. (D.) latimanus*; no associate). Jefferson County: (3) Salter Branch, 1.4 mi (2.2 km) W of Bartow on St Rte 242 (hosts: *C. (D.) latimanus, P. (O.) pubescens, P. (Pe.) petersi*; associates: *E. elliptica, U. equicurva*). (4) Creek 3.7 mi (5.9 km) NE of Johnson Co line on US Hwy 319 (hosts: *C. (D.) latimanus, P. (O.) pubescens, P. (S.) troglodytes*; associate: *U. equicurva*).

VARIATIONS.—In most features, there is considerable uniformity throughout the range of the species. The length of specimens from southeastern Georgia, however, is distinctly greater than that reported for members of the species from elsewhere. Their length ranges from 490 to 511 ($\bar{x}$ = 500) μm, and their height from 266–294 ($\bar{x}$ = 284) μm. Corresponding measurements of male specimens from South Carolina reported by Crawford (1959), spanning those of Hart and Hart (1974), are 420 to 480 ($\bar{x}$ = 449) μm and 240 to 270 ($\bar{x}$ = 258) μm, and those recorded by Hobbs and Peters (1977) for materials from North Carolina are 400 to 460 ($\bar{x}$ = 430) μm and 230 to 280 ($\bar{x}$ = 260) μm. With the largest specimens in the Ogeechee and Savannah basins, and the smallest in North Carolina, a reverse cline from that suggested for the size in *An. ancyla* appears likely to exist in *Di. striophylax*.

REMARKS.—We are convinced that most of the differences that seem apparent in the copulatory complex of the male reflect the angle at which the various components are viewed. For example, the trilobed finger guard (with the posteroventral extremities of the more posterior two lobes angulate) in some views appears to consist of only two rounded lobes, with the posteriormost completely obscured by the other two; infrequently, at another angle, the finger guard appears to consist of a single lobe with a strongly oblique ventral margin, but when slightly tilted the three lobes are clearly evident. A similar inconsistency prevails in the nature of the ornamentation of the distal part of the clasping apparatus: most often three terminal denticles are clearly defined, and, on the preaxial border frequently one to three small teeth or serrations are situated proximal to the denticles. In some preparations, however, no teeth are evident, and occasionally the three terminal denticles appear to be absent; instead the distalmost part of the ramus seems to be encircled by two or three rings. All such apparent variations appear to us to result from the angle at which the elements of

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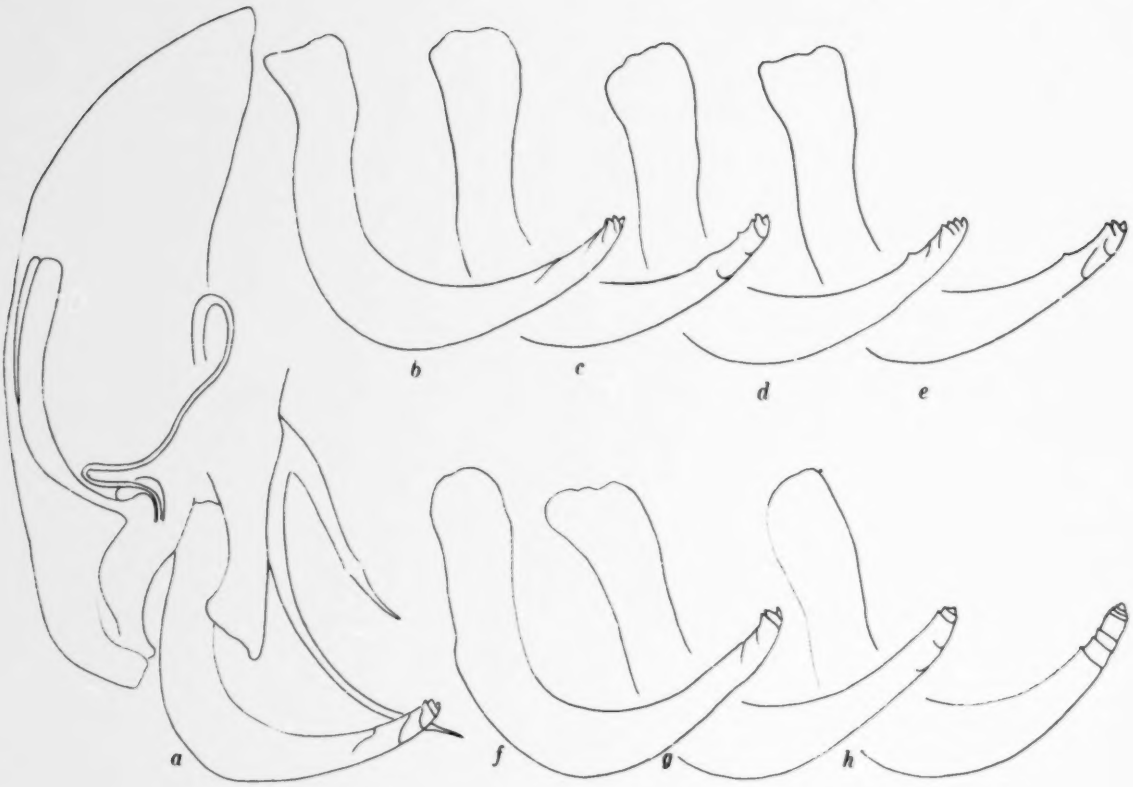

FIGURE 13.—*Dactylocythere striophylax: a*, copulatory complex of male; *b–h*, clasping apparatus of male. Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a–c*, Bulloch, 2; *d,e,g*, Jefferson, 4; *f,h*, Jefferson, 3.

the copulatory complex is viewed.

Genus *Entocythere* Marshall, 1903

Entocythere dorsorotunda Hoff

FIGURES 3*i*, 11, 15

Entocythere dorsorotunda Hoff, 1944:322, 341–345, figs. 11–14 [Type-locality: near Fitzgerald, Ben Hill County, Georgia. Types: holotype, allotype, and paratypes, USNM 81559; paratypes, C. Clayton Hoff. Host: "*Procambarus advena*" (= *Procambarus (H.) talpoides*)].—Hart and Hart, 1974:15, 83, 84, 86, 87, 91, pl. XXV: figs. 13–15, pl. LI.—Hobbs, 1981:344, 500.

Entocythere dentata.—Hart and Hart, 1974:86.

DIAGNOSIS.—Shell length of male 406–462 ($\bar{x}$ = 447) μm; shell height 217–259 ($\bar{x}$ = 235) μm. Shell subovate, slightly vaulted dorsally but lacking emarginations and prominences. Peniferum tapering ventrally but with extremity somewhat rounded. Rami of clasping apparatus disposed at angle distinctly greater than 90 degrees. Vertical ramus of clasping apparatus entire, distinctly longer than horizontal ramus, and slightly bowed anteriorly; horizontal ramus arched, mesial preaxial border bearing series of 5 acute teeth, mesial margins of which extending obliquely proximoventrally as much as slightly more than half height of ramus, and apex with 3 denticles;

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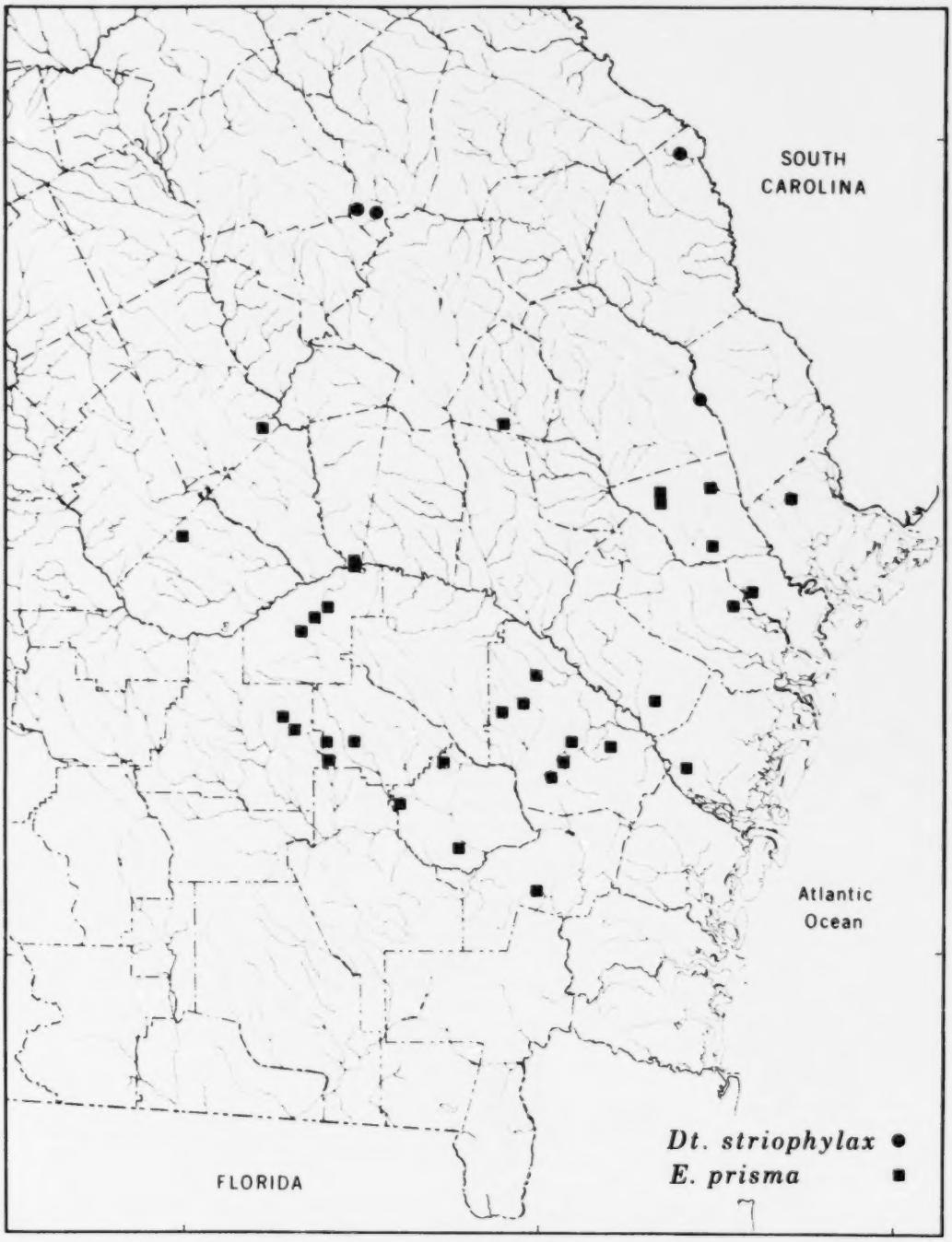

FIGURE 14.—Distribution of *Dactylocythere striophylax* and *Entocythere prisma* in southeastern Georgia.

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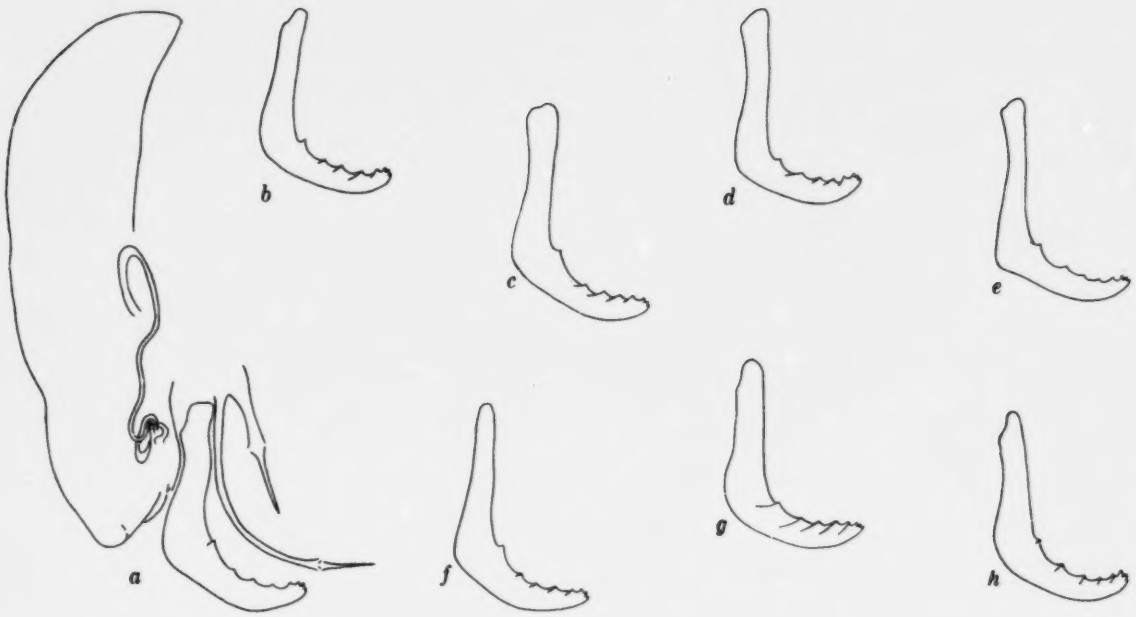

FIGURE 15.—*Entocythere dorsorotunda*: *a*, copulatory complex of male; *b–h*, clasping apparatus of male. Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a,d,e*, topotypes, Ben Hill, 6; *b*, Irwin, 12; *c*, Camden, 1; *f*, Lanier, 13; *g*, Echols, 11; *h*, Clinch, 8.

junction of rami very weakly or not produced postaxially in heel-like prominence, and lacking pouch on mesial surface of junction.

RANGE.—According to Hart and Hart (1974:87), this ostracod occurs in an area extending from just south of the Altamaha Basin in Georgia southward to Bay County in the panhandle and Charlotte and Dade counties in the peninsula of Florida. They also cited a disjunct locality in Mobile County, Alabama. All of the localities listed herein lie within this area.

SOUTHEASTERN GEORGIA RECORDS.—SATILLA BASIN. Camden County: (1) 1.4 mi (2.2 km) W of White Oak on St Rte 252 (host: *P. (H.) talpoides;* no associate). Pierce County: (2) roadside ditch 4.5 mi (7.2 km) E of Rte S1918 on S598 (hosts: *P. (H.) talpoides, P. (L.) p. pubischelae;* associates: *An. ancyla, An. hobbsi, E. prisma*). (3) near Blackshear (Hoff, 1944:345) (host: *P. advena* = *P. (H.) talpoides*; no associate cited). Wayne County: (4) roadside ditch 0.8 mi (1.3 km) W of US Hwy 82 on St Rte 99 (host: *P. (H.) talpoides;* associates: *An. freyi, An. hobbsi*). (5) roadside ditch 5.8 mi (9.3 km) W of US Hwy 82 on St Rte 99 (host: *P. (H.) talpoides, P. (L.) p. pubischelae;* associates: *An. ancyla, An. hobbsi, E. prisma*).

SUWANNEE BASIN. Ben Hill County: (6) type-locality (host: *P. (H.) talpoides;* associate: *An. hobbsi*). Clinch County: (7) near Fargo (Hoff, 1944:345) (host: *P. (O.) seminolae;* no associate). (8) roadside ditch 7.7 mi (12.3 km) S of Homerville on St Rte 89 (hosts: *P. (H.) talpoides, P. (L.) p. pubischelae;* associate: *An. hobbsi*). (9) roadside ditch 15.4 mi (24.6 km) N of Fargo on US Hwy 441 (hosts: *P. (H.) talpoides, P. (H.) pygmaeus;* associate: *An. hobbsi*). Cook County: (10) 5.6 mi (9 km) N of Hahira on US Hwy 41 (Hart and Hart, 1974:76) (host: *P. (H.) talpoides*, not *P. advena;* no associate). Echols County: (11) roadside ditch 3.6 mi (5.8 km) N of Florida line on

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US Hwy 441 (Hart and Hart, 1974:87) (host: *P. (O.) seminolae;* associate: *An. hobbsi*). Irwin County: (12) Tift-Irwin Co line on St Rte 52 (host: *P. (O.) seminolae;* associates: *An. ancyla, An. hobbsi, E. elliptica*). Lanier County: (13) 2.2 mi (3.5 km) W of Clinch Co line on St Rte 64 (host: *P. (H.) talpoides;* associates: *An. ancyla, An. hobbsi*). Ware County: (14) 12 mi (19.2 km) N of Waycross on US Hwy 1 (Hart and Hart, 1974:86) (host: *P. (L.) p. pubischelae;* no associate).

Entocythere elliptica Hoff

FIGURES 3*h*, 16, 17

Entocythere elliptica Hoff, 1944:328, 330, 331, 345–349, figs. 15–21 [Type-locality: north of Fargo, Clinch County, Georgia. Types: holotype, allotype, paratypes, USNM 81560; paratypes, C. Clayton Hoff. Host: *Procambarus seminolae* Hobbs].—Crawford, 1959:157.—Hart, 1959:193, 194, 201, figs. 15, 16; 1962:122, 134.—Walton and Hobbs, 1959:115.—Tressler, 1959:728, fig. 28.183.—Hobbs and Walton, 1966:246.—Hart and Hart, 1969:185.—Hart and Hart, 1974:15, 84, 87, 88, 91, 93, pl. XXVI: figs. 1, 2, pl. LI.—Hobbs III, 1978:508.—Hobbs, 1981:71, 231, 295, 312, 399, 403, 431, 450, 498, 501.

Entocythere eleptica.—Tressler, 1947:705.—Rioja, 1949:327 [erroneous spelling].

Entocythere internotalus Crawford, 1959:150, 157, 178, 180, 181, figs. 1–9 [Type-locality: Colonel's Creek, 14.6 miles (23.4 km) east of Columbia, Richland County, South Carolina, on St Rte 262. Types: holotype, allotype, morphotype, and paratype, USNM 103559, 103560, 103561, 103562, respectively; paratypes, E.A. Crawford, Jr., C. Clayton Hoff, E.N. Kozloff. Hosts: *Cambarus (P.) acuminatus* Faxon, 1884; *Procambarus (O.) enoplosternum* Hobbs]; 1961:238.—Hart, 1962:123, 134.—Hobbs, Holt, and Walton, 1967:18, 20, 25, 34, 38, 41, 43–45, 50, 54, 55, 58, 61, 63, 69, 72, 73, 77, 78, figs. 7b, 11a.—Ferguson, 1968:502.—Hobbs and Walton, 1968:246.—Hart and Hart, 1969:185; 1971:107, 111.—Peters, 1974:74; 1975:iii, 4, 5, 7, 8, 10, 14, 19, 22, 26, 29–34, figs. 5b, 7b, 15.—Hobbs and Peters, 1977:iv, 2, 3, 5–9, 12–14, 18, 21, 33, 36, 43, 46, 47, 52–54, 60, 61, 64, fig. 26, map 12; 1982:299–304, 306–322, 313–315, fig. 8.—Hobbs, 1981:97, 231, 337, 350, 356, 498–501.

DISCUSSION.—Our study of the members of the genus *Entocythere* from the southeastern part of Georgia has corroborated at least part of the conclusions reached by Hobbs and Peters (1982:314). We are convinced that Crawford's *Entocythere internotalus* does not differ from Hoff's *E. elliptica*, for, insofar as we are able to determine, some of the topotypes (Figure 16*a*) of the latter are indistinguishable from the types of *E. internotalus*. Furthermore, the many other specimens of this species that we have examined from elsewhere appear to us to be conspecific with Hoff's species. Certainly Crawford cannot be faulted for describing *E. internotalus*, for the distinctive structure (considered by Crawford to be a talon, hence the name) that forms the pouch-like prominence on the mesial surface of the junction of the rami of the clasping apparatus of the male is not evident in the holotype of *E. elliptica*, and if such was observed by Hoff in any of the specimens examined by him he did not mention it. Although we did not encounter a specimen like that reported by Hobbs and Peters (1982) in which one of the members of the paired clasping apparatus was typical of that of *E. elliptica* and the other, that of *E. internotalus*, we did find a gradation in the degree of development of the "internal talon." In a few specimens there exist decidedly weak mesial prominences at the junction of the rami. Moreover, in view of our specimens from the type-locality exhibiting well-developed prominences, we have concluded that the two are conspecific.

Unlike the findings of Hobbs and Peters (1982:314), we have seen no specimens of the genus *Entocythere* from southeastern Georgia, however, that exhibit the characteristic clasping apparatus of *E. reddelli* Hobbs and Walton (1968:243), nor have we encountered specimens that might be referred to *E. harrisi* Peters (1975:32). Thus we are unable to add data that would aid in clarifying the status of the last two species mentioned, ones that were also suspected by them as being specifically distinct from *E. elliptica*.

DIAGNOSIS.—Shell length of male 483–567 ($\bar{x}$ = 528.5) μm; shell height 224–280 ($\bar{x}$ = 258.9) μm. Shell elongate-ovate, lacking emarginations and prominences. Distal tooth of mandible with several cusps but not pectinate. Peniferum subtruncate ventrally, with rounded antero- and posteroventral extremities. Rami of clasping appa-

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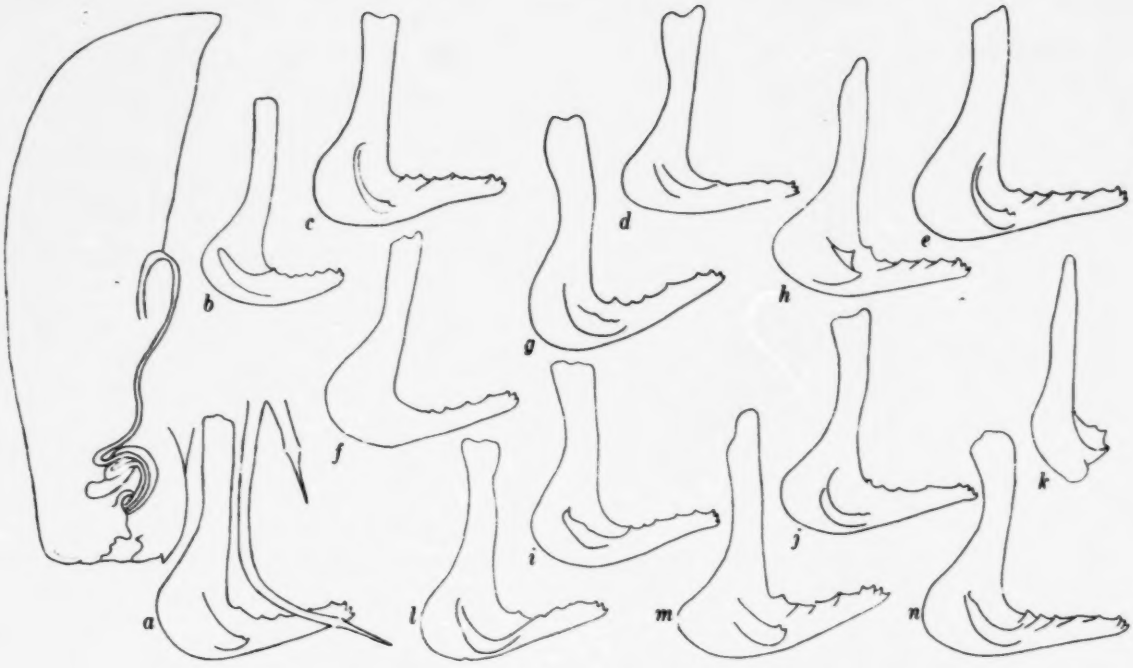

FIGURE 16.—*Entocythere elliptica* (*a*, copulatory complex of male; *b–n*, clasping apparatus of male): *a*, topotype, near Fitzgerald, Ben Hill Co; *b,k* (caudal view), Duhart Creek 6.5 mi (10.4 km) W of Wrens on St Rte 88, Jefferson Co; *c*, 7.9 mi (12.6 km) S of Twiggs Co line on US Hwy 129, Bleckley Co; *d*, ditch 5 mi (8 km) SE of St Rte 144 on Rte 169, Wayne Co; *e*, burrows along Newberry Creek 1.6 mi (2.6 km) SE of St Rte 80 on River Rd, Burke Co; *f*, pools 30 mi (48 km) N of Lake City, Florida off St Rte 82, Echols Co; *g*, creek 1.2 mi (1.9 km) W of Nashville on St Rte 76, Berrien Co; *h*, Little Ogeechee River 0.2 mi (0.3 km) N of St Rte 30 on Rte 17, Effingham Co; *i*, ditch 1.1 mi (1.8 km) W of Wayne Co line on St Rte 99, Appling Co; *j*, ditch 3.5 mi (5.6 km) W of Pooler on Quacco Rd, Chatham Co; *l*, ditch 1.3 mi (2.1 km) N of Rte S1493 on S2398, Ware Co; *m*, Little Ogeechee Pond, 5.7 mi (9.1 km) SSE of Bloomingdale, Chatham Co; *n*, creek 2 mi (3.2 km) S of Folkston on St Rte 121, Charlton Co.

ratus disposed at angle of about 90 degrees; vertical ramus longer than horizontal ramus and with pre- and postaxial borders entire; horizontal ramus straight, narrowing distally, its preaxial border bearing series of 5 teeth (not always clearly evident), postaxial border entire, and apex of ramus with 3 denticles; junction of rami produced in broadly rounded, postaxial, heel-like prominence and almost always bearing angularly margined pouch spanning mesial surface of junction.

RANGE.—Hart and Hart (1974:90) recorded the presence of *E. elliptica* and/or *E. internotalus* from Texas to North Carolina and from Kentucky to Florida, and Peters (1975:34) reported it from a number of localities in the James River watershed in Virginia.

SOUTHEASTERN GEORGIA RECORDS.—Like *Ankylocythere ancyla*, this ostracod is so widespread in southeastern Georgia that instead of citing the localities at which it has been found, the numbers of records for each of the countries are given here; its hosts and entocytherid associates may be found in Tables 2 and 3. SAVANNAH BASIN: Burke County (3), Effingham (2), Jefferson (1), Screven (3). OGEECHEE BASIN: Bryan (3), Bulloch

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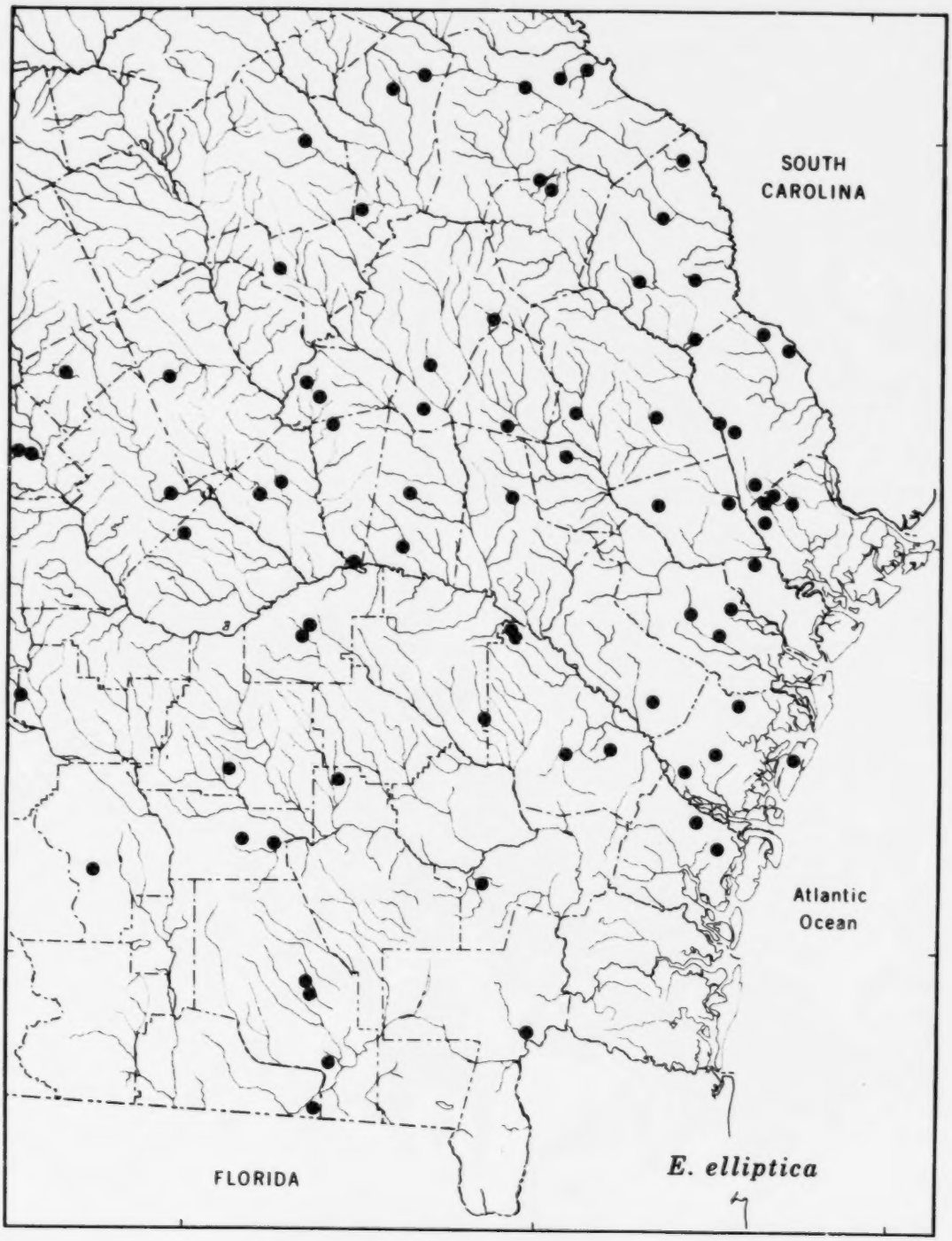

FIGURE 17.—Distribution of *Entocythere elliptica* in southeastern Georgia.

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(2), Candler (1), Chatham (4), Effingham (2), Emanuel (1), Evans (1), Jefferson (2), Jenkins (2), Johnson (2), Washington (1). NEWPORT BASIN: Liberty (3). ALTAMAHA BASIN: Bleckley (1), Dodge (1), Glynn (4), Johnson (1), Laurens (1), Long (1), McIntosh (2), Montgomery (2), Pulaski (2), Tattnall (1), Telfair (1), Toombs (2), Treutlen (2), Wayne (4), Wheeler (2). SATILLA BASIN: Appling (1), Atkinson (2), Brantley (1), Coffee (1), Jeff Davis (2), Ware (1). SAINT MARYS BASIN: Charlton (1). SUWANNEE BASIN: Berrien (1), Clinch (3), Echols (1), Irwin (1).

In southeastern Georgia, *Entocythere elliptica* was retrieved from collections containing 23 species of crayfishes and has been definitely implicated in infesting 10 of them. The number of times the crayfish was present in collections containing this ostracod is noted as follows: *C. (D.) latimanus* (4), *F. clypeata* (4), *P. (H.) advena* (6), *P. (H.) caritus* (1), *P. (H.) pygmaeus* (9), *P. (H.) talpoides* (1), *P. (H.) truculentus* (3), *P. (L.) barbatus* (13), *P. (L.) pubischelae deficiens* (4), *P. (L.) p. pubischelae* (4), *P. (O.) a. acutus* (4), *P. (O.) enoplosternum* (15), *P. (O.) epicyrtus* (10), *P. (O.) litosternum* (5), *P. (O.) lunzi* (9), *P. (O.) pubescens* (6), *P. (O.) seminolae* (14), *P. (Pe.) petersi* (3), *P. (Pe.) raneyi* (1), *P. (Pe.) spiculifer* (3), *P. (S.) howellae* (8), *P. (S.) paeninsulanus* (2), *P. (S.) troglodytes* (13).

REMARKS.—Whereas in southeastern Georgia this ostracod exhibits a comparatively wide range in size (the males measuring 490 to 590 μm in length, average 531 μm north of the Altamaha River and 518 μm south of it), the previously recorded range in size for the species is greater than that observed in this area. So that the lengths of our specimens can be compared with those of others recorded in the literature, all are converted to hundredths of mm. In the James and York basins of Virginia, males exhibit lengths of 0.54 to 0.57 mm (Peters, 1975:33); in North Carolina, 0.55 to 0.62 mm (Hobbs and Peters, 1977:52); in Richland County, South Carolina, 0.51 to 0.62 mm (Crawford, 1959:152); and in the Coosa River basin of northern Georgia, 0.41 to 0.51 mm (Hobbs and Peters, 1982:315). In the latter basin most of the individuals are distinctly shorter than they are throughout sections of the range for which measurements are available. Within the area considered herein the largest specimen came from the Ogeechee Basin and the smallest from the Altamaha, but there is little difference in the range in size of specimens from any of the drainage systems in the area.

Attention should be called to the fact that some of the differences in the clasping apparatus of the males that are illustrated in Figure 16 are due to the angle at which they were drawn, but there does seem to be some variation in the elevation of the teeth on the preaxial border of the horizontal ramus as noted in Figure 16*d* and *g*.

Entocythere prisma, new species

FIGURES 3*j,k*, 14, 18

DIAGNOSIS.—Shell length of male 420–455 ($\bar{x}$ = 437) μm; shell height 217–245 ($\bar{x}$ = 232.8) μm. Shell length of triunguis female 420–462 ($\bar{x}$ = 450.3) μm; shell height 224–266 ($\bar{x}$ = 252.4) μm. Shell subovate, lacking emarginations and prominences. Peniferum tapering ventrally. Angle between rami of clasping apparatus about 90 degrees, appearing much less in many preparations. Distal tooth of mandible with 5 cusps but not pectinate. Vertical ramus of clasping apparatus entire and distinctly longer than horizontal ramus. Preaxial margin of latter with row of 5 angular plates extending across mesial surface of ramus, proximal 3 plates with pre- and postaxial free angles usually clearly evident, those of second and third from base invariably well defined.

MALE.—Eye located between 0.20 and 0.22 shell length from anterior margin. Shell (Figure 3*k*) with greatest height slightly posterior to midlength where about 1.3 times that at level of eye; margin entire. Submarginal setae rather evenly dispersed ventrally, closer together anteroventrally and posteriorly, and sparse dorsally.

Copulatory complex (Figure 18*a*) with peniferum exhibiting no features distinguishing this from other species of genus; as usual, wall of anteroventral part thickened, heavily sclerotized,

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and with apparent strong, ventrally directed anteroventral spine; penis situated in ventral 0.25 of peniferum. Clasping apparatus as described in "Diagnosis." Dorsal finger rather heavy, directed ventrally and terminating in seta almost reaching end of vertical ramus of clasping apparatus; slender ventral finger disposed subparallel to clasping apparatus.

FEMALE.—Eye located about 0.2 shell length from anterior end. Shell (Figure 3*j*) somewhat kidney-shaped with dorsal margin strongly convex and ventral concave, fundus of concavity slightly anterior to midlength. Greatest height just posterior to midlength where about 1.4 times that at level of eye. Distribution of submarginal setae similar to that in male except anteroventrally where not so close together.

TYPE-LOCALITY.—Goose Run Creek, 7.7 miles (12.4 km) NW of McIntosh County line on St Rte 99, Long County, Georgia. The specimens were obtained from a container in which *Procambarus (H.) pygmaeus, P. (O.) enoplosternum*, and *P. (O.) lunzi* had been preserved; entocytherid associates were *An. spargosis* and *E. elliptica*.

DISPOSITION OF TYPES.—The type series consists of specimens from the following localities listed below: Chatham County (1), Bryan County (2, 5, 6), Liberty County (9), and Long County (type-locality). The holotype and allotype are deposited in the National Museum of Natural History, Smithsonian Institution, USNM 213649 and 213650, respectively. A paratypic male is in the British Museum and another in the personal collection of H.H. Hobbs III, Wittenberg University. The remaining paratypes are in the Smithsonian Institution.

RANGE.—This ostracod ranges in the Piedmont and Coastal Plain of Georgia from the lower Savannah River basin southward to the Satilla Basin in McIntosh and Brantley counties, westward into Laurens, Telfair, and Coffee counties. Thus whereas the Altamaha River marks the northern and southern limits of the range of several freshwater decapods in the

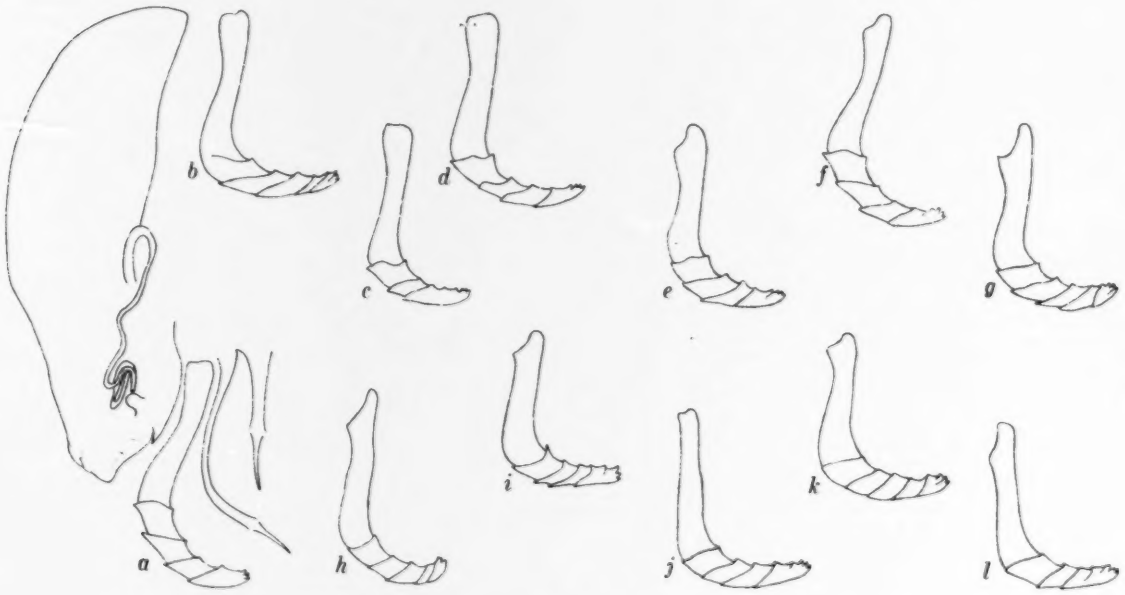

FIGURE 18.—*Entocythere prisma: a*, copulatory complex of male; *b–l*, clasping apparatus of male. Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a,f,g*, holotype, Long, 11; *b*, Telfair, 15; *c,d*, Coffee, 27; *e*, Brantley, 25; *h–k*, Wayne, 16; *l*, Bacon, 22.

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southeast, it has not restricted that of this ostracod, which infests crayfishes occurring both north and south of the river. In light of its presence in the Canoochee Sub-basin of the Altamaha it is surprising that we have no record of its occurrence in the Ohoopee watershed.

SOUTHEASTERN GEORGIA RECORDS.—SAVANNAH BASIN. Chatham County: (1) 2 mi (3.2 km) W of Potter on US Hwy 80 (host: *P. (H.) advena;* no associate).

OGEECHEE BASIN. Bryan County: (2) 2 mi (3.2 km) S of Pembroke on St Rte 119 (hosts: *P. (H.) advena, P. (L.) barbatus, P. (O.) litosternum, P. (S.) troglodytes;* associates: *An. ancyla, An. spargosis, E. elliptica).* (3) Pembroke on St Rte 119 (hosts: *P. (O.) litosternum, P. (S.) troglodytes;* no associate). (4) 2.3 mi (3.7 km) S of Pembroke on St Rte 119 (hosts: *P. (H.) pygmaeus, P. (L.) barbatus, P. (O.) lunzi;* associate: *An. ancyla*). (5) 7.9 mi (12.6 km) W of US Hwy 17 on St Rte 67 (hosts: *P. (H.) pygmaeus, P. (L.) barbatus, P. (O.) lunzi, P. (S.) troglodytes;* associates: *An. ancyla, An. spargosis*). (6) Mill Creek, 1.2 mi (1.9 km) N of Ellabelle (hosts: *P. (H.) pygmaeus, P. (L.) barbatus, P. (O.) epicyrtus;* associates: *An. ancyla, An. spargosis*). Candler County: (7) adjacent to Wolfe Creek on St Rte 129 (hosts: *P. (H.) truculentus, P. (L.) barbatus;* associates: *An. ancyla, E. elliptica*).

NEWPORT BASIN. Bryan County: (8) 1 mi (1.6 km) W of Ways Station (= Richmond Hill) (host: *P. (S.) troglodytes;* no associate). (9) 2 mi (3.2 km) N of Fleming (hosts: P. (H.) *pygmaeus, P. (S.) troglodytes;* associates: *An. ancyla, An. spargosis, E. elliptica*).

ALTAMAHA BASIN. Laurens County: (10) 20.6 mi (33 km) S of Dublin on St Rte 19 (hosts: *P. (H.) caritus, P. (O.) a. acutus, P. (O.) enoplosternum;* associate: *An. ancyla*). Long County: (11) Type-locality. McIntosh County: (12) 6.5 mi (10.4 km) W of US Hwy 17 on St Rte 251 (hosts: *P. (H.) pygmaeus, P. (O.) enoplosternum, P. (S.) troglodytes;* associate: *An. spargosis*). Montgomery County: (13) 1.4 mi (2.2 km) N of Jeff Davis Co line on US Hwy 221 (hosts: *P. (L.) pubischelae deficiens, P. (O.) seminolae;* associates: *An. ancyla, E. elliptica*). (14) 4.8 mi (7.7 km) S of Uvalda on US Hwy 221 (hosts: *P. (H.) caritus, P. (L.) p. deficiens, P. (O.) seminolae;* associate: *An. ancyla*). Telfair County: (15) 6.2 mi (9.9 km) W of US Hwy 441 on US Hwy 280 (hosts: *F. clypeata, P. (H.) caritus, P. (O.) howellae;* no associate). Wayne County: (16) 5.5 mi (8.8 km) S of Jesup on US Hwy 301 (host: *P. (H.) talpoides;* associate: *An. ancyla*). (17) 0.4 mi (0.6 km) S of Little Penholloway Cr on US Hwy 301 (host: *P. (H.) talpoides;* associate: *An. ancyla*). (18) 0.4 mi (0.6 km) W of Broadhurst on Rte S1920 (host: *P. (H.) caritus;* associate: *An. hobbsi*). (19) 3.0 mi (4.8 km) W of Rte S169 on Rte S1922 (host: *P. (H.) talpoides;* associate: *An. ancyla*). (20) junction of Rtes S1491 and S605 (host: *P. (H.)* sp.; associate: *An. hobbsi*). (21) 1.0 mi (1.6 km) SE of Gardi on US Hwy 341 (host: *P. (H.) pygmaeus, P. (L.) p. deficiens, P. (O.) seminolae;* associate: *An. ancyla*).

SATILLA BASIN. Bacon County: (22) 0.2 mi (0.3 km) S of Coffee Co line in SSW corner of county (hosts: *P. (H.) caritus, P. (H.) talpoides;* associate: *An.* sp.). (23) 2.9 mi (4.6 km) SW of Alma on St Rte 64 (host: *P. (H.) talpoides;* associate: *An. hobbsi*). (24) Coffee Co line at St Rte 32 (host: *P. (L.) p. pubischelae;* associate: *An. ancyla*). Brantley County: (25) Buffalo Cr, 3.2 mi (5.1 km) SSW of Nahunta on US Hwy 301 (host: *P. (H.) talpoides;* no associate). Coffee County: (26) 5 mi (8 km) SE of US Hwy 221 on S1730 (host: *P. (H.) caritus, P. (H.) talpoides;* associate: *An. hobbsi*). (27) 1.8 mi (2.9 km) SE of US Hwy 221 on S1730 (hosts: *P. (H.) talpoides, P. (O.) seminolae;* associates: *An. ancyla, An. hobbsi*). Jeff Davis County: (28) 1 mi (1.6 km) S of US Hwy 341 on US Hwy 221 (hosts: *P. (H.) caritus, P. (L.) p. deficiens, P. (O.) seminolae;* associate: *An. ancyla*). (29) 7.8 mi (12.5 km) SW of Hazelhurst on US Hwy 221 (hosts: *P. (H.) pygmaeus, P. (O.) seminolae;* no associates). (30) 1.3 mi (2.1 km) SW of Hazelhurst on US Hwy 221 (hosts: *P. (H.) caritus, P. (L.) p. deficiens;* no associate).

Pierce County: (31) 3.2 mi (5.1 km) SE of US Hwy 82 on St Rte 15 (host: *P. (H.) talpoides;* associate: *An. hobbsi*). (32) 4.5 mi (7.2 km) E of Rte S1918 on S598 (host: *P. (H.) talpoides, P. (L.) p. pubischelae;* associates: *An. ancyla, An. hobbsi, E. dorsorotunda*). (33) 0.5 mi (0.8 km) SE of Bacon Co line on St Rte 32 (host: *P. (H.) talpoides;*

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associate: *An. ancyla*). Wayne County: (34) 2.4 mi (3.8 km) N of St Rte 99 on S1492 (host: *P. (H.) caritus;* associate: *An. ancyla*). (35) 8.0 mi (12.8 km) NE of St Rte 99 on S1492 (host: *P. (H.) caritus;* associate: *An. ancyla*). (36) just E of Odum on St Rte 27 (hosts: *P. (L.) p. deficiens;* associate: *An. ancyla*). (37) 0.7 mi (1.1 km) E of S605 on S1491 (hosts: *P. (H.) p. deficiens, P. (H.) pygmaeus;* associate: *An. ancyla*).

RELATIONSHIPS.—*Entocythere prisma* seems to have its closest affinities with *E. dorsorotunda* and *E. elliptica*, but is unique among its congeners in possessing a conspicuous series of ridges on the mesial surface of the horizontal ramus of the clasping apparatus of the male, some of which project beyond both the preaxial and postaxial borders.

VARIATIONS.—Although the range in size of specimens from north and south of the Altamaha River is little different (the smallest specimen is a male from Locality 15 in Telfair County having a shell length of 413 μm, shorter than that of any other on either side of the river), the males of those populations sampled from north of the river are, on the average, smaller than are those to the south, average lengths of 431.4 and 442.7 μm, respectively (n = 30 and 29 individuals, respectively). Most of the differences in the clasping apparatus illustrated in Figure 18 result from the position assumed by the element rather than to structural variation.

Genus *Uncinocythere* Hart, 1962

Uncinocythere equicurva (Hoff)

FIGURES 3*f*, 9, 19

Entocythere equicurva Hoff, 1944:332, 337–341, figs. 6–10 [Type-locality: 2.3 miles (3.7 km) S of Woodbine, Camden County, Georgia. Types: holotype, allotype, and paratypes, USNM. Host: *Procambarus (S.) paeninsulanus*].—Rioja, 1945:422; 1949:328.—Tressler, 1947:705; 1959:729, fig. 28.186.—Kozloff and Whitman, 1954:162.—Hobbs, 1955:330; 1981:223, 270.—Hart, 1959:193, 194, 203, 204, fig. 14; 1962:137.—Walton and Hobbs, 1959:114, 118, 120, fig. 17.—Crawford, 1961:238.—Hart, 1962:122, 137.

Entocythere lucifuga Walton and Hobbs, 1959:118–120, figs. 7–13 [Type-locality: Hog Sink, about 13 miles (21 km) W of Gainesville, Alachua County, Florida. Types: holotype, allotype, and morphotype, USNM; paratypes, E.A. Crawford, Jr., USNM. Host: *Procambarus (O.) lucifugus alachua* (Hobbs)].—Hart and Hobbs, 1961:173, 181.—Hart, 1962:123.

Entocythere telmoecea Crawford, 1959:150, 151, 167–173, 178, 180, 181, 183, figs. 24–30 [Type-locality: Gill's Creek on St Rte 48, 2.7 miles (4.3 km) SSE of the University of South Carolina stadium, Richland County, South Carolina. Types: holotype, allotype, and morphotype, USNM; paratypes: E.A. Crawford, Jr., C. Clayton Hoff, Eugene N. Kozloff, USNM.].—Crawford, 1961:237.—Hart, 1962:123, 128.

Uncinocythere equicurva.—Hart, 1962:137.—Hart and Hart, 1974:15, 122, 128, 129, pl. XXXVI: figs. 1–3; pl. LV.—Villalobos and Hobbs, 1974:9.—Hobbs, 1981:223, 270, 449, 500, 501.

Uncinocythere lucifuga.—Hart, 1962:138.—Hobbs and Walton, 1963:457.—Ferguson, 1968:502.—Villalobos and Hobbs, 1974:9.—Hart and Hart, 1974:130–131, pl. XXXVI: figs. 9–12, pl. LVII.—Hobbs, 1981:499–501.

Ankylocythere telmoecea.—Hart, 1962:128.—Hobbs and Walton, 1963:459.—Hobbs, 1966:68, fig. 9; 1981:498–501.—Hobbs, Holt, and Walton, 1967:77.—Ferguson, 1968:501.—Hart and Hart, 1971:106–111.—Peters, 1974:74; 1975:iii, 5–8, 10, 13, 19–23, 27, 28, figs. 2b, 11.—Hart and Hart, 1974:15, 21, 25, 28, 31–33, pl. IV: figs. 1–5; pl. XLVI.—Hobbs and Peters, 1977:iii, 1, 5–7, 9, 12, 18–20, 21, 36, 43, 52, 54, 69, fig. 4.

Ankylocythere telmocea.—Hobbs and Peters, 1982:302 [erroneous spelling].

DIAGNOSIS.—Shell length 308–378 ($\bar{x}$ = 344) μm; shell height 168–210 ($\bar{x}$ = 195) μm. Peniferum shallowly excavate ventrally with subacute anteroventral extension. Angle between rami of clasping apparatus less than 90 degrees. Vertical ramus of clasping apparatus entire and subequal in length to, or shorter than, horizontal ramus; latter with 1 or 2 (if 2, more proximal one larger) teeth on preaxial margin at about midlength; postaxial margin evenly contoured or with excrescence (adnate talon) opposite tooth on preaxial margin; apex of ramus with 2 (or rarely 3; see final paragraph of "Remarks") denticles.

RANGE.—The Piedmont and Coastal Plain provinces from the Chattahoochee-Apalachicola River basin in Alabama and Georgia to the York River basin in Virginia. The localities in Tennessee and Texas cited by Hart and Hart (1974:128, 129) should be confirmed.

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SOUTHEASTERN GEORGIA RECORDS.—SAVANNAH BASIN. Burke County: (1) Briar Creek at Heath's Bridge between Sardis and Girard (Hart and Hart, 1974:131, as *U. lucifuga* (host: *P. (S.) troglodytes;* no associate). Chatham County: (2) Savannah (Hart and Hart, 1974:32, as *An. telmoecea*) (host: *P. (S.) troglodytes*; no associate). Jefferson County: (3) 18.1 mi (29 km) NW of Waynesboro on St Rte 80 (host: *P. (O.) pubescens;* associate: *E. elliptica*). Screven County: (4) Beaverdam Creek at US Hwy 301 (host: *C. (D.) latimanus, P. (O.) pubescens, P. (S.) troglodytes;* associates: *An. ancyla, An. tiphophila, E. elliptica*). (5) Briar Creek, 10 mi (16.1 km) NE of Sylvania (host: *P. (S.) troglodytes;* no associate).

OGEECHEE BASIN. Burke County: (6) Rocky Creek 5.0 mi (8 km) W of Waynesboro (Hart and Hart, 1974:32, as *An. telmoecea*) (host: *P. (O.) pubescens;* no associate). (7) 5.1 mi (8.2 km) E of Waynesboro (Hart and Hart, 1974:131, as *U. lucifuga*) (host: *C. (D.) latimanus;* no associate). Effingham County: (8) Ogeechee River at St Rte 119 (hosts: *F. clypeata, P. (O.) enoplosternum, P. (S.) troglodytes;* associates: *An. tiphophila, E. elliptica*). Jefferson County: (9) 1.4 mi (2.2 km) W of Bartow on St Rte 242 (host: *C. (D.) latimanus, P. (O.) pubescens, P. (Pe.) petersi;* associates: *Dt. striophylax, E. elliptica*). (10) 3.7 mi (5.9 km) NE of Johnson Co line (hosts: *C. (D.) latimanus, P. (O.) pubescens, P. (S.) troglodytes;* associate: *Dt. striophylax*). (11) 6.5 mi (10.4 km) W of Wrens on St Rte 88 (hosts: *C. (D.) latimanus, P. (Pe.) petersi:*

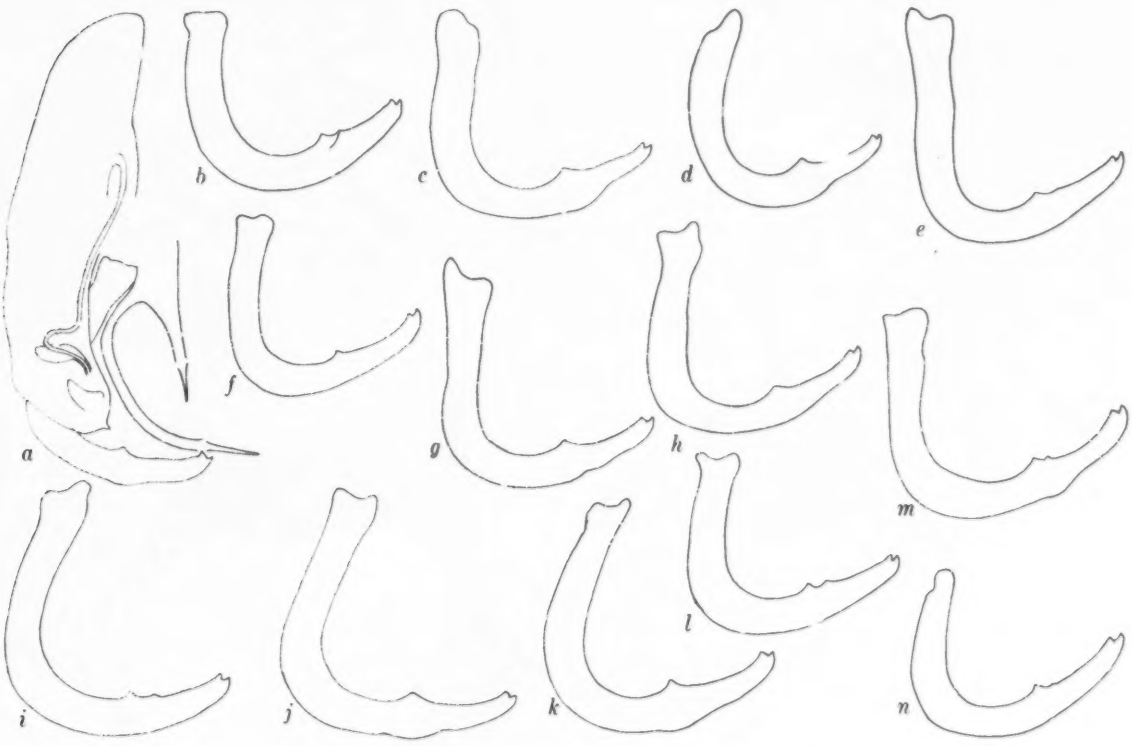

FIGURE 19.—*Uncinocythere equicurva: a,* copulatory complex of male; *b–n,* clasping apparatus of male. Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a,i,j,k,* Charlton, 25; *b,c,* Wilkinson, 23; *d,* 4.7 mi (7.5 km) E of Houston Co line on St Rte 96, Twiggs Co (extra limital); *e,* Burke, 6; *f,* Berrien, 26; *g,h,* McIntosh, 21; *l,m* (paratype), *n,* Camden, 24.

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associate: *E. elliptica*). (12) Magnolia Springs below dam (host: *P. (O.) pubescens;* associate: *E. elliptica*). Screven County: (13) Ogeechee River at St Rte 24 (hosts: *F. clypeata, P. (O.) enoplosternum, P. (Pe.) petersi, P. (S.) troglodytes;* associate: *An. ancyla*). Washington County: (14) Ogeechee Swamp at Jefferson Co line at St Rte 88 (host: *P. (O.) a. acutus;* no associate). (15) 4.1 mi (6.6 km) W of Jefferson Co line on St Rte 88 (hosts: *C. (D.) latimanus, P. (O.) pubescens, P. (Pe.) petersi;* associate: *E. elliptica*).

ALTAMAHA BASIN. Dodge County: (16) Little Ocmulgee River at St Rte 165 (host: *P. (O.) enoplosternum, P. (S.) howellae;* associate: *E. elliptica*). Laurens County: (17) 15.3 mi (24.5 km) NE of Cochran on St Rte 26 (Hart and Hart, 1974:129) (hosts: *P. (O.) pubescens, P. (Pe.) spiculifer;* no associate). (18) Stitchihatchee Creek at Dexter (hosts: *C. (D.) striatus, F. clypeata, P. (O.) a. acutus, P. (S.) howellae;* associates: *An. ancyla, E. elliptica*). (19) 2.6 mi (4.2 km) NE of US Hwy 441 on St Rte 338 (hosts: *C. (D.) striatus, C. (D.) truncatus;* associate: *U. simondsi*). (20) 1.5 mi (2.4 km) SW of US Hwy 80 on St Rte 26 (host: *P. (S.) howellae;* no associate). McIntosh County: (21) 5.4 mi (8.6 km) S of Eulonia (Hart and Hart, 1974:131, as *U. lucifuga*) (host: *P. (S.) troglodytes;* no associate). Washington County: (22) 1.4 mi (2.2 km) E of Baldwin Co line on St Rte 24 (hosts: *C. (D.) striatus, P. (O.) enoplosternum, P. (S.) howellae;* no associate). Wilkinson County: (23) 8.4 mi (13.4 km) E of Twiggs Co line on St Rte 96 and 0.7 mi (1.1 km) S on secondary rd (host: *C. (D.) striatus;* no associate).

SATILLA BASIN: Camden County: (24) type-locality, about 2.3 mi (3.7 km) S of Woodbine (Hoff, 1944:337) (host: *P. (S.) paeninsulanus;* associate: *U. simondsi*).

SAINT MARYS BASIN. Charlton County: (25) 2.0 mi (3.2 km) N of Folkston on US Hwy 1 (host: *P. (O.) a. acutus;* no associate).

SUWANNEE BASIN. Berrien County: (26) 1.2 mi (1.9 km) W of Nashville on St Rte 76 (hosts: *P. (H.) pygmaeus, P. (Pe.) spiculifer, P. (S.) paeninsulanus;* associates: *An. ancyla, E. elliptica*).

REMARKS.—This ostracod, originally described in considerable detail by Hoff (1944), was reported by him to occur in 12 localities (10 in Florida and one each in Alabama and Georgia). Only the type-locality was particularized, but judging by the list of hosts, all of those in Florida are in the northern part of the State, east of the Choctawhatchee River, and that in Alabama either in the Alabama or Tennessee river basin. According to Hoff, the horizontal ramus of the clasping apparatus of his specimens possesses two teeth, some specimens with a rudimentary third, on the preaxial border and two or three poorly developed apical teeth; the postaxial border is unadorned. In his study of the entocytherids of Richland County, South Carolina, Crawford (1959) described the apparently distinctive "*Entocythere telmoecea*" in which the horizontal ramus exhibits a single tooth on the preaxial border, two apical teeth, and the postaxial border bears a distinct excrescence opposite the tooth on the preaxial margin. The third name applied to this entocytherid was *Entocythere lucifuga* by Walton and Hobbs (1959). They recognized that this cave-dwelling ostracod had much in common with *U. equicurva* but believed that the combination of a "clasping apparatus with one or two teeth on the internal border and two terminal teeth; eyes lacking" (Walton and Hobbs, 1959:120) was unique.

The ranges of both *U. equicurva* and *U. lucifuga* were considerably extended by Hart and Hart (1974:131) who reported them from a number of localities in northern Florida east of the Choctawhatchee River and from localities scattered across Georgia south of the Fall Line. The single record for *U. lucifuga* cited by them in Alabama was in the southern Chattahoochee Basin. Except for two isolated localities in Tennessee and Texas (pages 128, 129) for *U. equicurva*, the ranges cited for the two are almost congruent. The range of *An. telmoecea* (as determined by Hart and Hart, 1974:32, 33; Peters, 1975, fig. 11; Hobbs and Peters, 1977, map 4; 1982, fig. 4) lies mostly to the north of that of the other two, reaching as far north as the York River basin in southeastern Virginia.

We have re-examined the type specimens in the Smithsonian Institution of all three species

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and specimens from most of the localities cited for them by Hart and Hart (1974). Moreover, specimens from the 24 localities listed here and others of "*E. telmoecea*" from throughout its range have been compared with the types. For the reason discussed in the following paragraph, we are convinced that the names proposed by Walton and Hobbs and by Crawford are synonyms of Hoff's *Entocythere equicurva*.

In the southeastern part of the range (lowermost Georgia and Florida), the horizontal ramus of the clasping apparatus lacks, or bears only a rudiment of, the adnate talon (excrescence) that is conspicuous in most members of the species occurring to the north. Whereas two or three teeth on the preaxial border of the clasping apparatus are present in specimens from the extreme southern and southeastern parts of the range, a single tooth on the preaxial border and two apical teeth are characteristic of most populations occurring north of the lower Satilla Basin. The length of the shell among the specimens from Georgia is quite variable, ranging from 322 to 385 μm, and some of those with shorter shells occur in localities near those with the longer ones; for example, topotypes (Camden County: Satilla Basin) with shells 308 to 343 μm in length differ quite markedly from specimens in neighboring Charlton County (St. Marys Basin) which have shells 357 to 378 μm long. Some of the latter also exhibit a weak talon, and a single tooth on the preaxial border of the horizontal ramus; some specimens have the "typical" two teeth on the preaxial border.

Hobbs (1981:376) suggested that the crayfish *P. (O.) a. acutus* from Charlton County, which these specimens were infesting, perhaps represents "an introduction, probably by fishermen." This might account for the larger size of these ostracods as compared with the types of *U. equicurva* from nearby localities; indeed when more is known about regional variations in the species, perhaps the source of the introduced crayfish host and its possibly introduced ostracod symbionts can be approximated.

Except for the presence or absence of eyes, among the specimens from Georgia that we have assigned to Hoff's species, there can be found a complete admixture of the few characters that formerly were believed to distinguish the three described species (see Figure 19). As for the eyes, there is at least some evidence that the presence or absence of pigment may be correlated with environmental conditions; its absence seems to be correlated with a subterranean environment.

In many individuals (perhaps populations) occurring in the Carolinas and Virginia, including the holotype of Crawford's *Entocythere telmoecea*, the shell is more highly vaulted than it is in any of the specimens we have from the area treated herein, but shells that are proportionately as low have been observed in specimens from the more northern parts of the range.

Hoff (1944) in describing *U. equicurva* stated that its clasping apparatus possesses two or three apical denticles. In all of our material there are only two, and we suspect that among specimens that he believed to be conspecific were representatives of *U. simondsi* (which we found among our topotypes), a species in which three apical denticles are characteristic.

Uncinocythere simondsi (Hobbs and Walton)

FIGURES 3g, 11, 20

Entocythere simondsi Hobbs and Walton, 1960:17, figs. 1–10 [Type-locality: Dunn Creek, 1.9 miles (3 km) W of Fighting Town Creek on Hell's Hollow Road, Fannin County, Georgia. Types: holotype and allotype, USNM 105956; paratypes USNM, E.A. Crawford, Jr. Host: *Cambarus (C.) bartonii* and "*Cambarus* sp." (= *C. (D.) latimanus*)].—Hart, 1962:123.—Hobbs, 1981:70.

Uncinocythere simondsi.—Hart, 1962:138.—Hart and Hart, 1966:9; 1974:15, 118, 122, 133–136, 139, 140, pl. 37: figs. 4–7, pl. LV.—Hobbs and Walton, 1975:15, 18; 1976:399; 1977:605, 609, 612.—Hobbs and Peters, 1977:iv, 3–12, 21, 22, 24, 29, 36, 41, 43, 45, 46, 50, 52, 54, 56–58, 63, 64, fig. 33, map 5; 1982:299, 301–304, 306–313, 315, 316, fig. 9.—Hobbs III, 1978:508.—Hobbs, 1981:70, 71, 97, 215, 231, 295, 380, 450, 498–501.

DIAGNOSIS.—Shell length of males 315–364 ($\bar{x}$ = 338.3) μm; shell height, 182–203 ($\bar{x}$ = 190.4) μm. Shell subovate, lacking emarginations

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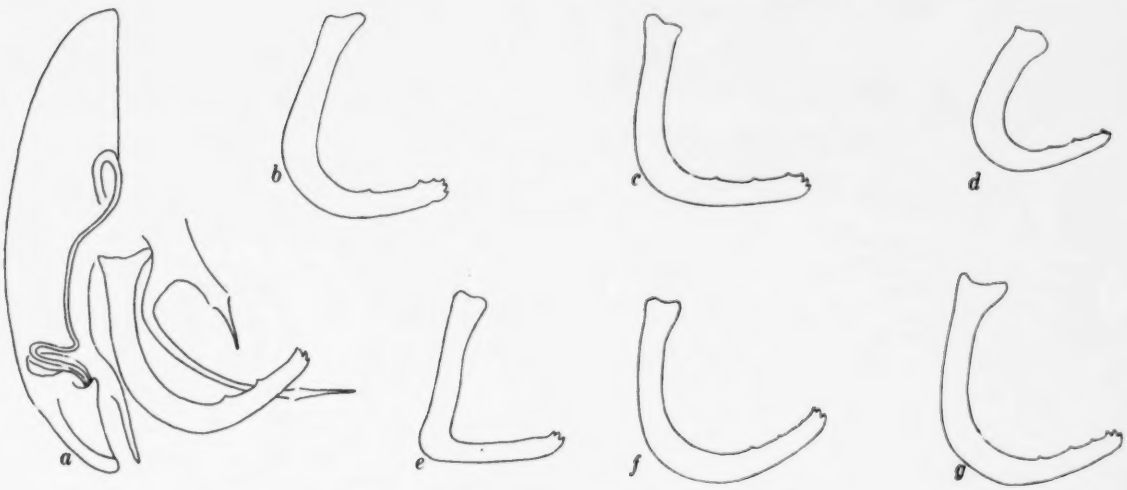

FIGURE 20.—*Uncinocythere simondsi: a,* copulatory complex of male; *b–g,* clasping apparatus of male. Names of counties from which specimens were obtained are followed by numbers referring to localities listed under "Southeastern Georgia Records": *a,c,f,g,* Laurens, 1; *b,* Camden, 3; *d,e,* Appling, 2.

and prominences. Peniferum deeply cleft ventrally with acute anteroventrally directed posteroventral tip. Vertical ramus of L-shaped clasping apparatus subequal in length to horizontal ramus and with pre- and postaxial borders entire; horizontal ramus with 3 teeth on preaxial border, more distal one approaching dorsalmost of 3 apical denticles; postaxial border of horizontal ramus entire and lacking excrescence near midlength.

RANGE.--This is one of the most widespread entocytherids in the eastern part of the United States, ranging, according to Hart and Hart (1974:134), from Illinois and Kentucky to the panhandle of Florida, and from Mississippi to Georgia and South Carolina. Hobbs and Peters (1977:63) reported it from the mountains and Piedmont Province of North Carolina, and (1982:316) recorded its presence throughout most of the Coosa and Tennessee drainage basins in northern Georgia. Herein it is cited from only three localities in the Altamaha and St. Marys river systems in southeastern Georgia.

SOUTHEASTERN GEORGIA RECORDS.—ALTAMAHA BASIN. Laurens County: (1) ditch 2.6 mi (4.2 km) NE of US Hwy 441 on St Rte 338 (hosts: *C. (D.) striatus, C. (D.) truncatus;* associate: *U. equicurva*). Appling County: (2) ditch 3 mi (4.8 km) S of Baxley on US Hwy 1 (host: *P. (H.) caritus;* associates: *An. ancyla, An. hobbsi*).

SAINT MARYS BASIN. Camden County: (3) ditch about 2.3 mi (3.7 km) S of Woodbine (host: *P. (S.) paeninsulanus;* associate: *U. equicurva*).

VARIATIONS.—Only five males of this ostracod have been examined from the three localities in southeastern Georgia. Except for the short shell (315 μm) of the single male from Appling County and that with the longest shell (364 μm) from Laurens County, the range in length is 329 to 350 μm, thus being within the range given by Hart and Hart (1974:133), 325 to 350 μm. The smallest is a little longer than that reported by Hobbs and Peters (1977:63) for specimens examined by them from North Carolina, 310 μm. Otherwise there is remarkable uniformity among the five specimens from southeastern Georgia.

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